МИНИСТЕРСТВО ОБРАЗОВАНИЯ И НАУКИ
РОССИЙСКОЙ ФЕДЕРАЦИИ

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ИНОСТРАННЫЙ ЯЗЫК

АННОТИРОВАНИЕ И РЕФЕРИРОВАНИЕ ТЕКСТОВ НА АНГЛИЙСКОМ ЯЗЫКЕ

Рекомендовано Редсоветом университета
в качестве учебного пособия по английскому языку
для студентов, обучающихся по направлению
08.03.01 "Строительство"

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Представлены тексты на английском языке, содержащие информацию о современных строительных материалах и задания к ним.

Подготовлено на кафедре иностранных языков и предназначено для аудиторной и самостоятельной работы студентов, обучающихся по направлению подготовки 08.03.01 "Строительство".

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ПРЕДИСЛОВИЕ

Учебное пособие содержит тексты, представляющие информацию о современных строительных материалах, используемых в строительстве. Среди них имеются тексты, посвященные производству и применению бетона, кирпича, пластмасс и др. В текстах также говорится об их свойствах и характеристиках. Все тексты являются аутентичными источниками из английских и американских журналов. Некоторые предложения текстов были слегка адаптированы для снятия трудностей понимания и перевода.

Тексты предназначены для аудиторной и самостоятельной работы студентов. Они предусматривают развитие и тренировку навыков аннотирования и реферирования литературы на английском языке. Данное учебное пособие рекомендуется к использованию при подготовке к сдаче зачетов и экзаменов. Кроме того, тексты пособия могут быть использованы для написания письменных контрольных работ. Их также можно использовать для подготовки тематических докладов и сообщений.

Учебное пособие рекомендуется для работы со студентами-бакалаврами направления подготовки 08.03.01 "Строительство". Оно способствует реализации соответствующих компетенций данного направления подготовки – ОК-5, ОК-6. Данное пособие поможет студентам:

- овладеть навыками устной речи, аннотированием и реферированием;
- изучить базовую терминологическую лексику;
- участвовать в профессиональных беседах на английском языке.

Часть I. ТЕКСТЫ ДЛЯ АННОТИРОВАНИЯ И РЕФЕРИРОВАНИЯ

Текст №1

1. Прочитайте текст и ознакомьтесь с его содержанием.
2. Выпишите интернациональную лексику и переведите с помощью словаря.
3. Напишите аннотацию текста на русском языке.
4. Составьте реферат текста на русском языке.

In large construction projects, such as this skyscraper in Melbourne, cranes are essential

Types of construction materials

Building material is any material which is used for a construction purpose.

Many naturally occurring substances, such as clay, sand, wood and rocks, even twigs and leaves have been used to construct buildings. Apart from naturally occurring materials, many man-made products are in use, some more and some less synthetic. The manufacture of building materials is an established industry in many countries and the use of these materials is typically segmented into specific specialty trades, such as carpentry, plumbing, roofing and insulation work. They provide the make-up of habitats and structures including homes.

Fabric

The tent is the home of choice among nomadic groups all over the world. Two well known types include the conical teepee and the circular yurt. It has been revived as a major construction technique with the development of tensile architecture and synthetic fabrics. Modern buildings can be made of flexible material such as fabric membranes, and supported by a system of steel cables, rigid or internal (air pressure.)

Mud and clay

The amount of each material used leads to different styles of buildings. The deciding factor is usually connected with the quality of the soil being used. Larger amounts of clay usually mean using the cob/adobe style, while low clay soil is usually associated with sod building. The other main ingredients include more or less sand/gravel and straw/grasses. Rammed earth is both an old and newer take on creating walls, once made by compacting clay soils between planks by hand, now forms and mechanical pneumatic compressors are used.

Soil and especially clay is good thermal mass; it is very good at keeping temperature at a constant level. Homes built with earth tend to be naturally cool in the summer heat and warm in cold weather. Clay holds heat or cold, releasing it over a period of time like stone. Earthen walls change temperature slowly, so artificially raising or lowering the temperature can use more resources than in say a wood built house, but the heat/coolness stays longer. Peoples building with mostly dirt and clay, such as cob, sod, and adobe, resulted in homes that have been built for centuries in western and northern Europe as well as the rest of the world, and continue to be built, though on a smaller scale. Some of these buildings have remained habitable for hundreds of years.

Wood

A natural material for building dwellings for thousands of years, wood was also used to make Churches in the past. The main problems with wood structures are fire risk and durability. Wood is an aesthetically pleasing material that never goes out of trend completely, though the current popularity of plastic is taking its place in many construction sites.

Shasta Dam under construction in June 1942

Rock

Rock structures have existed for as long as history can recall. It is the longest lasting building material available, and is usually readily available. There are many types of rock throughout the world all with differing attributes that make them better or worse for particular uses. Rock is a very dense material so it gives a lot of protection too, its main drawback as a material is its weight and awkwardness.

Its energy density is also considered a big drawback, as stone is hard to keep warm without using large amounts of heating resources.

Dry stone walls have been built for as long as humans have put one stone on top of another. Eventually different forms of mortar were used to hold the stones together, cement being the most common place now.

The granite-strewn uplands of Dartmoor National Park, United Kingdom, for example, provided ample resources for early settlers. Circular huts were constructed from loose granite rocks throughout the Neolithic and early Bronze Age, and the remains of an estimated 5,000 can still be seen today. Granite continued to be used throughout the Medieval period (see Dartmoor longhouse) and into modern times. Slate is another stone type, commonly used as roofing material in the United Kingdom and other parts of the world where it is found.

Mostly stone buildings can be seen in most major cities, some civilizations built entirely with stone such as the Pyramids in Egypt, the Aztec pyramids and the remains of the Inca civilization.

Three types of rock used in building materials

Granite is a widely occurring form of igneous rock. Granite is formed by magma and found in the continental plates of the earth's crust. Granite does contain uranium, so it does give off natural radiation, but is generally considered to be safe for use in construction. Granite can be pink to grey in colour, with a medium to corse texture. Granite is often polished when used in construction to make it more durable and aesthetically appealing. It is most commonly used for counter top and floor surfaces.

Sandstone is a sedimentary rock formed by microscopic grains of rocks and minerals such as quartz and feldspar. Sandstone comes in an array of colours including the most commonly-seen brown, tan, yellow, pink, red, white and grey. Sandstone is preferred for use in building because it is weather-resistant, yet easy to work with. It is also a porous and heat-resistant rock making it ideal for floors, walls, fireplaces and pavers.

Slate is a type of sedimentary rock formed from clay and volcanic ash. Slate is most commonly seen in shades of grey, but is also seen in varying shades of blue, green and purple. It is extremely hard and non-porous. Slate is most commonly used for roofing tiles, floor tiles and pavers.

Made from recrystallised carbonate minerals such as calcite or dolomite, marble is a metamorphic rock. Marble is non-porous and weather resistant, which makes it ideal for use in construction. White is the most common colour of marble, but it also comes in shades of grey, pink, green, blue, black, brown and yellow. When used in construction, marble is typically polished to make it more aesthetically appealing and durable. It is used for countertops, floors and a variety of decorative finishings.

Thatch

Thatch is one of the oldest of building materials known; grass is a good insulator and easily harvested. Many African tribes have lived in homes made completely of grasses year round. In Europe, thatch roofs on homes were once prevalent but the material fell out of favor as industrialization and improved transport increased the availability of other materials. Today, though, the practice is undergoing a revival. In the Netherlands, for instance, many new buildings have thatched roofs with special ridge tiles on top.

Brush

Brush structures are built entirely from plant parts and are generally found in tropical and sub-tropical areas, such as rain forests, where very large leaves can be used in the building of Native Americans for resting and living in, too. These are built mostly with branches, twigs and leaves, and bark, similar to a beaver's lodge. These were variously named wikiups, lean-tos, and so forth.

Concrete

Concrete is a composite building material made from the combination of aggregate and a binder such as cement. The most common form of concrete is Portland cement concrete, which consists of mineral aggregate (generally graveland sand), Portland cement and water. After mixing, the cement hydrates and eventually hardens into a stone-like material. When used in the generic sense, this is the material referred to by the term concrete.

For a concrete construction of any size, as concrete has a rather low tensile strength, it is generally strengthened using steel rods or bars (known as rebars). This strengthened concrete is then referred to as reinforced concrete. In order to minimise any air bubbles, that would weaken the structure, a vibrator is used to eliminate any air that has been entrained when the liquid concrete mix is poured around the ironwork. Concrete has been the predominant building material in this modern age due to its longevity, formability, and ease of transport. Recent advancements, such as Insulating concrete forms, combine the concrete forming and other construction steps (installation of insulation). All materials must be taken in required proportions as described in standards.

The National Cement Share Company of Ethiopia's new plant in Dire Dawa

Metal

Metal is used as structural framework for larger buildings such as skyscrapers, or as an external surface covering. There are many types of metals used for building. Steel is a metal alloy whose major component is iron, and is the usual choice for metal structural building materials. It is strong, flexible, and if refined well and/or treated lasts a longtime. Corrosion is metal's prime enemy when it comes to longevity.

The lower density and better corrosion resistance of aluminium alloys and tin sometimes overcome their greater cost. Brass was more common in the past, but is usually restricted to specific uses or specialty items today. Metal figures quite prominently in prefabricated structures such as the Quonset hut, and can be seen used in most cosmopolitan cities. It requires a great deal of human labor to produce metal, especially in the large amounts needed for the building industries.

Other metals used include titanium, chrome, gold, silver. Titanium can be used for structural purposes, but it is much more expensive than steel. Chrome, gold, and silver are used as decoration, because these materials are expensive and lack structural qualities such as tensile strength or hardness.

Glass

Glassmaking is considered an art form as well as an industrial process or material. Clear windows have been used since the invention of glass to cover small openings in a building. They provided humans with the ability to both let light into rooms while at the same time keeping inclement weather outside. Glass is generally made from mixtures of sand and silicates, in a very hot fire stove called a kiln and is very brittle. Very often additives are added to the mixture when making to produce glass with shades of colors or various characteristics (such as bulletproof glass, or light emittance).

The use of glass in architectural buildings has become very popular in the modern culture. Glass "curtain walls" can be used to cover the entire facade of a building, or it can be used to span over a wide roof structure in a "spaceframe". These uses though require some sort of frame to hold sections of glass together, as glass by itself is too brittle and would require an overly large kiln to be used to span such large areas by itself.

Plastic

Plastic pipes are penetrating a concrete floor in a Canadian highrise apartment building. The term plastics covers a range of synthetic or semi-synthetic organic condensation or polymerization products that can be molded or extruded into objects or films or fibers. Their name is derived from the fact that in their semi-liquid state they are malleable, or have the property of plasticity. Plastics vary immensely in heat tolerance, hardness, and resiliency. Combined with this adaptability, the general uniformity of composition and lightness of plastics ensures their use in almost all industrial applications today.

Foam

Foamed plastic sheet to be used as backing for fire stop mortar at CIBC bank in Toronto.

More recently synthetic polystyrene or polyurethane foam has been used in combination with structural materials, such as concrete. It is light weight, easily shaped and an excellent insulator. It is usually used as part of a structural insulated panel where the foam is sandwiched between wood or cement or insulating concrete forms, where concrete is sandwiched between two layers of foam.

Cement composites

Cement bonded composites are made of hydrated cement paste that binds wood or alike particles or fibers to make precast building components. Various fiberous materials including paper and fiberglass have been used as binders. Wood and natural fibres are composed of various soluble organic compounds like carbohydrates, glycosides and phenolics.

These compounds are known to retard cement setting. Therefore, before using a wood in making cement boned composites, its compatibility with cement is assessed. Wood-cement compatibility is the ratio of a parameter related to the property of a wood-cement composite to that of a neat cement paste. The compatibility is often expressed as a percentage value. To determine wood-cement compatibility, methods based on different properties are used, such as, hydration characteristics, strength, interfacial bond and morphology. Various methods are used by researchers such as the measurement of hydration characteristics of a cement-aggregate mix; the comparison of the mechanical properties of cement-aggregate mixes and the visual assessment of microstructural properties of the wood-cement mixes. It has been found that the hydration test by measuring the change in hydration temperature with time is the most convenient method. Recently, Karade et al. have reviewed these methods of compatibility assessment and suggested a method based on the 'maturity concept' i.e. taking in consideration both time and temperature of cement hydration reaction.

Modern industry

Modern building is a multibillion dollar industry, and the production and harvesting of raw materials for building purposes is on a world wide scale. Often being a primary governmental and trade key point between nations. Environmental concerns are also becoming a major world topic concerning the availability and sustainability of certain materials, and the extraction of such large quantities needed for the human habitat.

Building products

In the market place the term building products often refers to the ready-made particles/sections, made from various materials, that are fitted in architectural hardware and decorative hardware parts of a building. The list of building products exclusively exclude the building materials, which are used to construct the building architecture and supporting fixtures like windows, doors, cabinets, etc.

Building products do not make any part of a bajingo rather they support and make them working in a modular fashion.

It also can refer to items used to put such hardware together such as glues, caul-king, paint, and anything else bought for the purpose of constructing a building.

5. Дайте ответы на вопросы.

1. What building materials are described in the text?
2. What components are they made of?
3. Where are these building materials used?
4. Would you like to use these materials in the process of construction?

Текст №2

1. Прочитайте текст и ознакомьтесь с его содержанием.
2. Выпишите интернациональную лексику и переведите с помощью словаря.
3. Напишите аннотацию текста на русском языке.
4. Составьте реферат текста на русском языке.

Building materials

The Indian peoples of North America had developed mature building techniques suitable to Neolithic cultures long before Europeans established their first settlements on the continent. In the eastern area of America, forests covered most of the land, and building accordingly consisted of gabled, domed, or vaulted frames built up of branches or light trunks and covered with bark, thatch, or wattle and daub. On the prairies the collapsible tent of nomadic tribes was constructed of a conical framework of saplings covered with skins. Permanent structures in the northern areas were circular, framed in substantial timbers, and covered with a thick layer of mud and grass for insulation against the cold and for protection against snow and wind. In the Sierras, where snow was the chief problem, steeply pitched frames of trunks and branches were covered with heavy slabs of wood rudely shaped from trunks split by wind. Variations on these structures, built with larger openings and covered with thatch, appeared in the warmer coastal areas.

In the deserts of the Southwest, where wood was scarce and heat insulation a necessity, the large communal structures known as pueblos were constructed in tiered series of rectangular apartments. They had thick walls of adobe (sun-dried brick) and roofs composed of branches laid on transverse log beams and covered in turn with a heavy blanket of clay. In the canyons of what is now northern New Mexico and southern Colorado, clays suitable for brick were scarce, but there were extensive outcroppings of sandstone that could be easily broken off into building stones. The Indians who penetrated the canyons constructed their pueblos of thin sandstone tablets laid either on the alluvial floor or on shelves and notches eroded in the canyon walls.

The Europeans who established the North American colonies in the seventeenth century brought their knowledge of materials and techniques from their native lands, but during the first few years of settlement they were often compelled to adopt Indian techniques. The English, Dutch, German, and French who settled the seaboard and Gulf coast areas brought variations on framing in sawn timbers. Frames were usually covered with clapboard siding for walls and shingles for roofs – the latter gradually giving way to slate and tile in the more elegant houses, especially those built by the Dutch. Construction in thick wooden planks set vertically came to be common in parts of the Connecticut Valley, while construction of solid walls built up of horizontally laid logs was introduced by Swedish settlers in the Delaware Valley. The only stone in these early structures was confined to foundations and chimneys. Joints were originally the mortise-and-tenon form secured by wooden pegs, but handwrought nails began to be used early in the seventeenth century and machine-made varieties in the late eighteenth century.

In the more costly forms of buildings, brick laid up in lime mortar slowly replaced timber construction in the English-speaking areas, but expensive stone masonry was confined largely to the Dutch settlements of the New York area. The domed and vaulted construction of eighteenth-century mission churches required kiln-baked, stucco-covered brick, which was stronger and more manageable than the adobe brick, widely used in the Spanish Southwest. All of the traditional European building materials were used throughout the nineteenth century, although with some innovation. Heavy power-sawed timbers were used as posts, sills, girders, rafters, joists, and braces in buildings and truss bridges; deep laminated timbers of bolted planks were developed early in the nineteenth century for the arch ribs of bridges; thinner lumber, like the two-by-four, which was soon to become universal, became the basis of the light balloon frame invented in 1833. As the nation expanded, carefully dressed

Concrete and metal rebar used to build a floor masonry work of both stone and brick began to appear in large and elegant forms.

Iron

The most far-reaching revolution in the building arts came with the introduction of iron as a primary building material. Although it was first used as early as 1770 in England, it did not appear in the United States until about 1810, and then only in the form of wrought-iron braces and ties for timber arch-and-truss bridges. Cast-iron columns were first used in Philadelphia in 1822, and the cast-iron building front combined with interior cast-iron columns was well developed by 1848. The first cast-iron arch bridge was erected in 1836–1839, exactly sixty years after the English prototype. The first iron truss, again composed entirely of the cast metal, was introduced in 1840. Cast iron, however, is relatively weak in tension and therefore had to be replaced by wrought iron for beams and other horizontal elements as buildings and bridges grew larger and the loads upon them increased. The wrought-iron roof truss was introduced in 1837 and the combination cast-and wrought-iron bridge truss in 1845, both in the Philadelphia area. Wrought-iron floor beams of a depth adequate to the new commercial structures appeared almost simultaneously in three New York buildings in 1854. The first, although unsuccessful, application of metal wire to the suspension bridge was made in Philadelphia in 1816, but this practice was not common until 1842, when a second wire-cable suspension bridge was completed over the Schuylkill River in Pennsylvania.

Steel and Concrete

The rise of the new industrial nation following the Civil War was marked by two fundamental innovations in building construction: the use of steel and concrete as primary materials. The first appeared initially in two bridges erected almost simultaneously: the steel arch structure of Ead's Bridge, built by James B. Ead at St. Louis (1868–1874), and the steel cables suspending the deck of John A. Roebling's Brooklyn Bridge (1869–1883). The history of steel in buildings is more complex. The first elevator buildings of New York and Chicago were constructed with masonry-bearing walls and internal iron columns. The iron frame was expanded and elaborated during the 1870s and early 1880s until all internal loads were carried on cast-iron columns and wrought-iron floor beams. The decisive steps in skeletal or skyscraper construction came in Chicago: the first steel girders were introduced in the Home Insurance Building (1884–1885), and the first all-steel frame came with the second Rand McNally Building (1889–1890). Certain of these pivotal innovations in framed construction were anticipated in the Produce Exchange of New York (1881–1884).

Hydraulic concrete, originally a Roman invention, was revived in the late eighteenth century. Composed of lime (as a cementing agent), water, sand, and gravel or broken stone aggregate, it is virtually unlimited in use because in its plastic, pre-set state it can be cast in any structural shape. The hydraulic property comes from the presence of clayey materials in the lime, and before the technique of artificially producing the proper mixture was developed, builders had to depend on a supply of natural cement rock from which the hydraulic lime could be made. The regular use of concrete in the United States began in 1818, when deposits of cement rock were discovered in New York during construction of the Erie Canal. The first poured concrete house was constructed in 1835, and the first of precast block in 1837, both in the immediate area of New York City. The American manufacture of artificial cement was established in 1871; the use of mass concrete in walls, footings, jetties, dams, and arch bridges spread rapidly during the remainder of the century.

Plain concrete must be reinforced with iron or steel rods in order to sustain tensile and shearing stresses. Although the first experiments in this novel technique were carried out in England, France, and Germany, the first reinforced concrete structure was a house built in Port Chester, New York, in 1871–1876. The leading American pioneer in large-scale commercial and industrial building was Ernest Ransome, who built the first reinforced concrete bridge in 1889 and developed mature forms of reinforced concrete framing during the 1890s.

Few entirely new structural materials were introduced after 1900, but ferrous metals emerged in various chemical and mechanical alterations. The twentieth century saw the revival of chromium steel for the skyscrapers of the 1920s and the adaptation of self-weathering steel to structural uses in 1962. The major innovation in methods of joining members came with the application of electric arc welding to steel framing in 1920. Aluminum made its initial appearance as a structural material in 1933, when it was used for the floor framing of a bridge at Pittsburgh, Pennsylvania. Its role expanded to the primary structural elements of a bridge at Massena, New York, in 1946. The use of stressed-skin construction, with aluminum as a sheathing material, came with an experimental house of 1946, although similar construction in thin steel plate had been introduced in 1928.

The materials of reinforced concrete remained unchanged but were used in novel ways with the coming of shells (1934) and prestressed members (1938). Wood returned to large buildings in the form of heavy glue-laminated ribs and beams, appearing in the United States in 1937. Tubular forms of steel and aluminum came with the first geodesic dome in 1947. Plastics as a sheathing material were introduced in two conservatory buildings in St. Louis in 1962, but their use as a structural material came only in the 1970s.

5. Дайте ответы на вопросы.

1. What building materials are described in the text?
2. What components are they made of?
3. Where are these building materials used?
4. Would you like to use these materials in the process of construction?

Текст №3

1. Прочитайте текст и ознакомьтесь с его содержанием.
2. Выпишите интернациональную лексику и переведите с помощью словаря.
3. Напишите аннотацию текста на русском языке.
4. Составьте реферат текста на русском языке.

Brick

Small building unit in the form of a rectangular block, first produced in a sun-dried form at least 6,000 years ago. Clay, the basic ingredient, is mined from open pits, formed, and then fired in a kiln to produce strength, hardness, and heat resistance. Brick was the chief building material in the ancient Near East. Its versatility was expanded in ancient Rome by improvements in manufacture and by new techniques of bonding. Brick came to be widely used in Western Europe for the protection it offered against fire, masonry, mortar. How is a brick made?

An old brick wall in English bond laid with alternating courses of headersand stretchers

Background

The term brick refers to small units of building material, often made from fired clay and secured with mortar, a bonding agent comprising of cement, sand, and water. Long a popular material, brick retains heat, withstands corrosion, and resists fire. Because each unit is small usually four inches wide and twice as long, brick is an ideal material for structures in confined spaces, as well as for curved designs. Moreover, with minimal upkeep, brick buildings generally last a long time.

For the above-cited practical reasons and because it is also an aesthetically pleasing medium, brick has been used as a building material for at least 5,000 years. The first brick was probably made in the Middle East, between the Tigris and Euphrates rivers in what is now Iraq. Lacking the stone their contemporaries in other regions used for permanent structures, early builders here relied on the abundant natural materials to make their sun-baked bricks. These, however, were of limited use because they lacked durability and could not be used outdoors; exposure to the elements caused them to disintegrate. The Babylonians, who later dominated Mesopotamia, were the first to fire bricks, from which many of their tower-temples were constructed.

From the Middle East the art of brickmaking spread west to what is now Egypt and east to Persia and India. Although the Greeks, having a plentiful supply of stone, did not use much brick, evidence of brick kilns and structures remains throughout the Roman Empire. However, with the decline and fall of Rome, brickmaking in Europe soon diminished. It did not resume until the 1200s, when the Dutch made bricks that they seem to have exported to England. In the Americas, people began to use brick during the sixteenth century. It was the Dutch, however, who were considered expert craftsmen.

Prior to the mid-1800s, people made bricks in small batches, relying on relatively inefficient firing methods. One of the most widely used was an open clamp, in which bricks were placed on a fire beneath a layer of dirt and used bricks. As the fire died down over the course of several weeks, the bricks fired. Such methods gradually became obsolete after 1865, when the Hoffmann kiln was invented in Germany. Better suited to the manufacture of large numbers of bricks, this kiln contained a series of compartments through which stacked bricks were transferred for pre-heating, burning, and cooling.

The world's highest brick tower of St. Martin's Church in Landshut,Germany, completed in 1500

Brickmaking improvements have continued into the twentieth century. Improvements include rendering brick shape absolutely uniform, lessening weight, and speeding up the firing process. For example, modern bricks are seldom solid. Some are pressed into shape, which leaves *a frog,* or depression, on their top surface. Others are extruded with holes that will later expedite the firing process by exposing a larger amount of surface area to heat. Both techniques lessen weight without reducing strength.

However, while the production process has definitely improved, the market for brick has not. Brick does have the largest share of the opaque materials market for commercial building, and it continues to be used as a siding material in the housing industry. However, other siding materials such as wood, stucco, aluminum, plaster, and vinyl are strong competitors because they cost up to 50 percent less, and some (notably stucco and plaster) offer built-in insulation. Yet these systems can cost up to 1.75 times that of brick, which also requires less maintenance. Other materials that compete with brick despite their usually higher cost include precast concrete panels, glass, stone, artificial stone, concrete masonry, and combinations of these materials, because advances in manufacturing and design have made such materials more attractive to the builder. According to the U.S. Industrial Outlook, the use of brick as a siding material for single-family homes dropped from 26 percent in 1984 to 17 percent in 1989.

Raw Materials

Natural clay minerals, including kaolin and shale, make up the main body of brick. Small amounts of manganese, barium, and other additives are blended with the clay to produce different shades, and barium carbonate is used to improve brick's chemical resistance to the elements. Many other additives have been used in brick, including byproducts from papermaking, ammonium compounds, wetting agents, *flocculents* (which cause particles to form loose clusters) and *deflocculents* (which disperse such clusters). Some clays require the addition of sand or *grog* (pre-ground, pre-fired material such as scrap brick).

A wide variety of coating materials and methods are used to produce brick of a certain color or surface texture. To create a typical coating, sand (the main component) is mechanically mixed with some type of colorant. Sometimes *a flux* or *frit* (a glass containing colorants) is added to produce surface textures. The flux lowers the melting temperature of the sand so it can bond to the brick surface. Other materials including graded fired and unfired brick, nepheline syenite, and graded aggregate can be used as well.

The Manufacturing Process

The initial step in producing brick is crushing and grinding the raw materials in a separator and a jaw crusher. Next, the blend of ingredients desired for each particular batch is selected and filtered before being sent on to one of three brick shaping processes – extrusion, molding, or pressing, the first of which is the most adaptable and thus the most common. Once the bricks are formed and any subsequent procedures performed, they are dried to remove excess moisture that might otherwise cause cracking during the ensuing firing process. Next, they are fired in ovens and then cooled. Finally, they are dehacked – automatically stacked, wrapped with steel bands, and padded with plastic corner protectors.

Grinding, sizing, and combining raw materials

First, each of the ingredients is conveyed to a separator that removes oversize material. A jaw crusher with horizontal steel plates then squeezes the particles, rendering them still smaller. After the raw materials for each batch of bricks have been selected, a scalping screen is often used to separate the different sizes of material. Material of the correct size is sent to storage silos, and over-sized material goes to a hammer mill, which pulverizes it with rapidly moving steel hammers. The hammer mill uses another screen to control the maximum size of particle leaving the mill, and discharge goes to a number of vibrating screens that separate out material of improper size before it is sent on to the next phase of production.

Extrusion

With extrusion, the most common method of brick forming, pulverized material and water are fed into one end of a *pug mill,* which uses knives on a rotating shaft to cut through and fold together material in a shallow chamber. The blend is then fed into an extruder at the far end of the mill. The extruder usually consists of two chambers. The first removes air from the ground clay with a vacuum, thereby preventing cracking and other defects. The second chamber, a high-pressure cylinder, compacts the material so the auger can extrude it through the die. After it is compressed, the plastic material is forced out of the chamber through a specially shaped die orifice. The cross-section of the extruded column, called the "pug," is formed into the shape of the die. Sections of desired length are cut to size with rotating knives or stiff wires.

In molding, soft, wet clay is shaped in a mold, usually a wooden box. The interior of the box is often coated with sand, which provides the desired texture and facilitates removing the formed brick from the mold. Water can also be used to assist release. Pressing, the third type of brick forming, requires a material with low water content. The material is placed in a die and then compacted with a steel plunger set at a desired pressure. More regular in shape and sharper in outline than brick made with the other two methods, pressed bricks also feature frogs.

Chamfering the brick

Chamfering machines were developed to produce a furrow in brick for such applications as paving. These machines use rollers to indent the brick as it is being extruded. They are sometimes equipped with wire cutters to do the chamfering and cutting in one step. Such machines can produce as many as 20,000 units per hour.

Coating

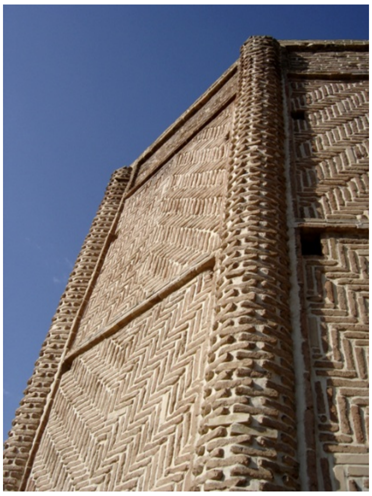
- The choice of sand coating, also applied as the brick is extruded, depends on how soft or hard the extruded material is. A continuous, vibrating feeder is used to coat soft material, whereas for textured material the coating may have to be brushed or rolled on. For harder materials a pressure roller or compressed air is used, and, for extremely hard materials, sand blasting is required.

Drying

- Before the brick is fired, it must be dried to remove excess moisture. If this moisture is not removed, the water will burn off too quickly during firing, causing cracking. Two types of dryers are used. Tunnel dryers use cars to move the brick through humidity-controlled zones that prevent cracking. They consist of a long chamber through which the ware is slowly pushed. External sources of fan-circulated hot air are forced into the dryer to speed the process.
- Automatic chamber dryers are also used, especially in Europe. The extruded bricks are automatically placed in rows on two parallel bars. The bricks are then fed onto special racks with finger-like devices that hold several pairs of bars in multiple layers. These racks are then transferred by rail-mounted transfer cars or by lift trucks into the dryers.

Firing

- After drying, the brick is loaded onto cars (usually automatically) and fired to high temperatures in furnaces called kilns. In general, the cars that moved the bricks through the drying process are also used to convey them through the tunnel kiln. These cars are pushed through the kiln's continuously maintained temperature zones at a specific rate that depends on the material. The majority of kilns in the United States use gas as a fuel source, though a third of the brick currently produced is fired using solid fuels such as sawdust and coal. Tunnel kilns have changed in design from high-load, narrow-width kilns to shorter, lower-set wider kilns that can fire more brick. This type of design has also led to high-velocity, long-flame, and low-temperature flame burners, which have improved temperature uniformity and lowered fuel consumption.



The brickwork of Shebeli Tower in Iran displays 12th-century craftsmanship

Setting and packaging

- After the brick is fired and cooled, it is unloaded from the kiln car via the dehacking process, which has been automated to the point where almost all manual brickhandling is eliminated. Automated setting machines have been developed that can set brick at rates of over 18,000 per hour and can rotate the brick 180 degrees. Usually set in rows eleven bricks wide, a stack is wrapped with steel bands and fitted with plastic strips that serve as corner protectors. The packaged brick is then shipped to the job site, where it is typically unloaded using boom trucks.

Quality Control

Though the brick industry is often considered unsophisticated, many manufacturers are participating in total quality management and statistical control programs. The latter involves establishing control limits for a certain process (such as temperature during drying or firing) and tracking the parameter to make sure the relevant processes are kept within the limits. Therefore, the process can be controlled as it happens, preventing defects and improving yields.

A variety of physical and mechanical properties must be measured and must comply with standards set by the American Society of Testing and Materials (ASTM). These properties include physical dimensions, density, and mechanical strength. Another important property is freeze-thaw durability, where the brick is tested under conditions that are supposed to simulate what is encountered in the outdoors. However, current tests are inadequate and do not really correlate to actual conditions. What passes in the laboratory may not pass in the field. Therefore, the brick industry is trying to develop a more accurate test.

A similar problem exists with a condition known as *efflorescence,* which occurs when water dissolves certain elements (salt is among the most common) in exterior sources, mortar, or the brick itself. The residual deposits of soluble material produce surface discoloration that can be worsened by improper cleaning. When salt deposits become insoluble, the efflorescence worsens, requiring extensive cleaning. Though a brick may pass the laboratory test, it could fail in the field due to improper design or building practices. Therefore, brick companies are developing their own in-house testing procedures, and research is continuing to develop a more reliable standard test.

The Future

Currently, the use of brick has remained steady, at around seven to nine billion a year, down from the 15 billion used annually during the early 1900s. In an effort to increase demand, the brick industry continues to explore alternative markets and to improve quality and productivity. Fuel efficiency has also improved, and by the year 2025 brick manufacturers may even be firing their brick with solar energy. However, such changes in technology will occur only if there is still a demand for brick.

Even if this demand continues, the brick industry both here and abroad faces another challenge: it will soon be forced to comply with environmental regulations, especially in the area of fluorine emissions. Fluorine, a byproduct of the brickmaking process, is a highly reactive element that is dangerous to humans. Long-term exposure can cause kidney and liver damage, digestive problems, and changes in teeth and bones, and the Environmental Protection Agency (EPA) has consequently established maximum exposure limits. To lessen the dangers posed by fluorine emissions, brickworks can install scrubbers, but they are expensive. While some plants have already installed such systems, the U.S. brick industry is trying to play a more important role in developing less expensive emissions testing methods and establishing emission limits. If the brick industry cannot persuade federal regulators to lower their requirements, it is quite possible that the industry could shrink in size, as some companies cannot afford to comply and will go out of business.

Brick

A construction material usually made of clay and extruded or molded as a rectangular block. Three types of clay are used in the manufacture of bricks: surface clay, fire clay, and shale. Adobe brick is a sun-dried molded mix of clay, straw, and water, manufactured mainly in Mexico and some southern regions of the United States.

The first step in manufacture is crushing the clay. The clay is then ground, mixed with water, and shaped. Then the bricks are fired in a kiln at approximately 2000°F (1093°C). Substances in the clay such as ferrous, magnesium, and calcium oxides impart color to the bricks during the firing process. The color may be uniform throughout the bricks, or the bricks may be manufactured with a coated face. The latter are classified as glazed, claycoat, or engobe.

The most commonly used brick product is known as facing brick. Decorative bricks molded in special shapes are used to form certain architectural details such as water tables, arches, copings, and corners.

1. A piece of equipment that has been programmed or configured into a *hung*, *wedged*, unusable state. Especially used to describe what happens to devices like routers or PDAs that run from firmware when the firmware image is damaged or its settings are somehow patched to impossible values. This term usually implies irreversibility, but equipment can sometimes be unbricked by performing a hard reset or some other drastic operation. Sometimes verbed: “Yeah, I bricked the router because I forgot about adding in the new access-list.”.

2. An outboard power transformer of the kind associated with laptops, modems, routers and other small computing appliances, especially one of the modern type with cords on both ends, as opposed to the older and obnoxious type that plug directly into wall or barrier strip.

Brick, ceramic structural material that, in modern times, is made by pressing clay into blocks and firing them to the requisite hardness in a kiln. Bricks in their most primitive form were not fired but were hardened by being dried in the sun. Sun-dried bricks were utilized for many centuries and are used even today in regions with the proper climate. Examples from approximately 5,000 years ago have been discovered in the Tigris-Euphrates basin, and the ancient races occupying this region may have been the first users of brick. In Babylonia there was a lack of both timber and stone, and the thick clay deposited by the overflowing rivers was the only material adaptable to building. The Persians and the Assyrians used sun-dried blocks of clay for walls of great thickness, facing them with a protective coating of fired bricks. The Egyptians and the Greeks used bricks only to a limited extent, as they had access to plentiful supplies of stone and marble. The Romans manufactured fired bricks in enormous quantities and gave them an important role as a basic structural material in buildings throughout the Roman Empire. Bricks played an important part in early Christian architecture until the decline of the empire. Whereas the Romans had usually concealed their brickwork beneath a decorative facing of stone or marble, the Byzantines devised a technique for exposing the bricks and giving them a full decorative expression. This technique influenced the Romanesque style and brought especially good results in Lombardy and in Germany, where bricks came to be arranged in immensely varied patterns. Since the Middle Ages, brickwork has been in constant use everywhere, adapting itself to every sort of construction and to every change of architectural style. At the beginning of the 19th cent. mechanical brick-making processes began to be patented and by the latter half of the century had almost entirely replaced the ancient hand-fashioning methods. Contemporary American building bricks are rectangular blocks with the standard dimensions of about $2^1/_4$ by $3^3/_4$ by 8 in. (5.7 by 9.5 by 20.3 cm). Good bricks are resistant to atmospheric action and high temperatures and are more durable than stone. Where heat resistance is especially important, fire bricks are used; these are made of special refractory clays called fire clays and are fired at very high temperatures.

A **brick** is a block or a single unit of a ceramic material used in masonry construction. Typically bricks are stacked together or laid as brickwork using various kinds of mortar to hold the bricks together and make a permanent structure. Bricks are typically produced in common or standard sizes in bulk quantities. They have been regarded as one of the longest lasting and strongest building materials used throughout history.

In the general sense, a "brick" is a standard-sized weight-bearing building unit. Bricks are laid in horizontal courses, sometimes dry and sometimes with mortar. When the term is used in this sense, the brick might be made from clay, lime-and-sand, concrete, or shaped stone. In a less clinical and more colloquial sense, bricks are made from dried earth, usually from clay-bearing subsoil. In some cases, such as adobe, the brick is merely dried. More commonly it is fired in a kiln of some sort to form a true ceramic.

The oldest domestic bricks were found in Greece. In the 12th century, bricks from Northern-Western Italy were re-introduced to Northern Germany, where an independent tradition evolved. It culminated in the so-called brick Gothic, a reduced style of Gothic architecture that flourished in Northern Europe, especially in the regions around the Baltic Sea, which are without natural rock resources. Brick Gothic buildings, which are built almost exclusively of bricks, are to be found in Denmark, Germany, Poland, and Russia.

During the Renaissance and the Baroque, visible brick walls were unpopular and the brickwork was often covered with plaster. It was only during the mid-18th century that visible brick walls regained some degree of popularity, as illustrated by the Dutch Quarter of Potsdam, for example.

House construction using bricks in Kerala, India

The transport in bulk of building materials such as bricks over long distances was rare before the age of canals, railways, roads and heavy goods vehicles. Before this time bricks were generally made close to their point of intended use. It has been estimated that in England in the 18th century carrying bricks by horse and cart for ten miles (16 km) over the poor roads then existing could more than double their price.

Bricks were often used for reasons of speed and economy, even in areas where stone was available. The buildings of the Industrial Revolution in Britain were largely constructed of brick and timber due to the demand created. During the building boom of the 19th century in the eastern seaboard cities of Boston and New York City, for example, locally made bricks were often used in construction in preference to the brown stones of New Jersey and Connecticut for these reasons.

The trend of building high office buildings that emerged towards the beginning of the 19th century displaced brick in favor of cast and wrought iron and later steel and concrete. Some early 'skyscrapers' were made in masonry, and demonstrated the limitations of the material – for example, the Monadnock Building in Chicago (opened in 1896) is masonry and just 17 stories high; the ground walls are almost 6 feet (1.8 m) thick to give the needed support; clearly building any higher would lead to excessive loss of internal floor space on the lower floors. Brick was revived for high structures in the 1950s following work by the Swiss Federal Institute of Technology and the Building Research Establishment in Watford, UK. This method produced 18-story structures with load-bearing walls no thicker than a single brick (150–225 mm). This potential has not been fully developed because of the ease and speed in building with other materials; in the late-20th century brick was confined to low- or medium-rise structures or as a thin decorative cladding over concrete-and-steel buildings or for internal non-load-bearing walls.

In Victorian London, bright red brick was chosen to make buildings more visible in the heavy fog that caused transport problems.

Bull's Trench Kilns

In India, brick making is typically a manual process. The most common type of brick kiln in use there is the **Bull's Trench Kiln** (BTK), based on a design developed by British engineer W. Bull in the late 19th century.

An oval or circular trench is dug, 6–9 metres wide, 2-2.5 metres deep, and 100–150 metres in circumference. A tall exhaust chimney is constructed in the centre. Half or more of the trench is filled with "green" (unfired) bricks which are stacked in an open lattice pattern to allow airflow. The lattice is capped with a roofing layer of finished brick.

In operation, new green bricks, along with roofing bricks, are stacked at one end of the brick pile; cooled finished bricks are removed from the other end for transport to their destinations. In the middle, the brick workers create a firing zone by dropping fuel (coal, wood, oil, debris, and so on) through access holes in the roof above the trench.

The advantage of the BTK design is a much greater energy efficiency compared with clamp or scove kilns. Sheet metal or boards are used to route the airflow through the brick lattice so that fresh air flows first through the recently burned bricks, heating the air, then through the active burning zone. The air continues through the green brick zone (pre-heating and drying the bricks), and finally out the chimney, where the rising gases create suction which pulls air through the system. The reuse of heated air yields savings in fuel cost.

As with the rail process above, the BTK process is continuous. A half dozen laborers working around the clock can fire approximately 15,000–25,000 bricks a day. Unlike the rail process, in the BTK process the bricks do not move. Instead, the locations at which the bricks are loaded, fired, and unloaded gradually rotate through the trench.

Extruded bricks

For extruded bricks the clay is mixed with 10–15% water (stiff extrusion) or 20–25% water (soft extrusion). This mixture is forced through a die to create a long cable of material of the desired width and depth. This mass is then cut into bricks of the desired length by a wall of wires. Most structural bricks are made by this method as it produces hard, dense bricks, and suitable dies can produce holes or other perforations as well. The introduction of such holes reduces the volume of clay needed, and hence the cost. Hollow bricks are lighter and easier to handle, and have thermal different properties than solid bricks. The cut bricks are hardened by drying for 20 to 40 hours at 50 to 150 °C before being fired. The heat for drying is often waste heat from the kiln.

European-style extruded bricks or blocks are used in single-wall construction with finishes applied on the inside and outside. Their many voids comprise a greater proportion of the volume than the solid, thin walls of fired clay. Such bricks are made in 15-, 25-, 30-, 42- and 50-cm widths. Some models have very high thermal insulation properties, making them suitable for zero-energy buildings.

Calcium-Silicate bricks

The raw materials for calcium-silicate bricks include lime mixed with quartz, crushed flint or crushed siliceous rock together with mineral colourants. The materials are mixed and left until the lime is completely hydrated; the mixture is then pressed into moulds and cured in an autoclave for two or three hours to speed the chemical hardening. The finished bricks are very accurate and uniform, although the sharp arrises need careful handling to avoid damage to brick (and bricklayer). The bricks can be made in a variety of colours; white is common but pastel shades can be achieved.

This type of brick is common in Sweden, especially in houses built or renovated in the 1970s, where it is known as "Mexitegel" (en: Mexi[can] Bricks).

In India these are known as Fly ash bricks, manufactured using the FaL-G (fly ash, lime and gypsum) process.

Calcium-silicate bricks are also manufactured in Canada and the United States, and meet the criteria set forth in ASTM C73 – 10 Standard Specification for Calcium Silicate Brick (Sand-Lime Brick). It has lower embodied energy than cement based man-made stone and clay brick.

Influence on fired colour

The fired colour of clay bricks is influenced by the chemical and mineral content of the raw materials, the firing temperature, and the atmosphere in the kiln. For example, pink coloured bricks are the result of a high iron content, white or yellow bricks have a higher lime content. Most bricks burn to various red hues; as the temperature is increased the colour moves through dark red, purple and then to brown or grey at around1,300 °C (2,372 °F). Calcium silicate bricks have a wider range of shades and colours, depending on the colourants used. The names of bricks may reflect their origin and colour, such as London stock brick and Cambridgeshire White.

"Bricks" formed from concrete are usually termed blocks, and are typically pale grey in colour. They are made from a dry, small aggregate concrete which is formed in steel moulds by vibration and compaction in either an "egglayer" or static machine. The finished blocks are cured rather than fired using low-pressure steam. Concrete blocks are manufactured in a much wider range of shapes and sizes than clay bricks and are also available with a wider range of face treatments – a number of which simulate the appearance of clay bricks.

An impervious and ornamental surface may be laid on brick either by salt glazing, in which salt is added during the burning process, or by the use of a "slip", which is a glaze material into which the bricks are dipped. Subsequent reheating in the kiln fuses the slip into a glazed surface integral with the brick base.

Natural stone bricks are of limited modern utility due to their enormous comparative mass, the consequent foundation needs, and the time-consuming and skilled labour needed in their construction and laying. They are very durable and considered more handsome than clay bricks by some. Only a few stones are suitable for bricks. Common materials are granite, limestone and sandstone. Other stones may be used (for example, marble, slate, quartzite, and so on) but these tend to be limited to a particular locality.

Xhosa brickmaker at kiln near Ngcobo in the former Transkei in 2007

Loose bricks

For efficient handling and laying, bricks must be small enough and light enough to be picked up by the bricklayer using one hand (leaving the other hand free for the trowel). Bricks are usually laid flat and as a result the effective limit on the width of a brick is set by the distance which can conveniently be spanned between the thumb and fingers of one hand, normally about four inches (about 100 mm). In most cases, the length of a brick is about twice its width, about eight inches (about 200 mm) or slightly more. This allows bricks to be laid *bonded* in a structure which increases stability and strength (for an example, see the illustration of bricks laid in *English bond*, at the head of this article). The wall is built using alternating courses of *stretchers*, bricks laid longways, and *headers*, bricks laid crossways. The headers tie the wall together over its width. In fact, this wall is built in a variation of *English bond* called *English cross bond* where the successive layers of stretchers are displaced horizontally from each other by half a brick length. In true *English bond* the perpendicular lines of the stretcher courses are in line with each other.

A bigger brick makes for a thicker (and thus more insulating) wall. Historically, this meant that bigger bricks were necessary in colder climates (see for instance the slightly larger size of the Russian brick in table below), while a smaller brick was adequate, and more economical, in warmer regions. A notable illustration of this correlation is the Green Gate in Gdansk; built in 1571 of imported Dutch brick, too small for the colder climate of Gdansk, it was notorious for being a chilly and drafty residence. Nowadays this is no longer an issue, as modern walls typically incorporate specialized insulation materials.

The correct brick for a job can be selected from a choice of colour, surface texture, density, weight, absorption and pore structure, thermal characteristics, thermal and moisture movement, and fire resistance.

Bricks may also be classified as *solid* (less than 25% perforations by volume, although the brick may be "frogged," having indentations on one of the longer faces), *perforated* (containing a pattern of small holes through the brick, removing no more than 25% of the volume), *cellular* (containing a pattern of holes removing more than 20% of the volume, but closed on one face), or *hollow* (containing a pattern of large holes removing more than 25% of the brick's volume). Blocks may be solid, cellular or hollow.

The term "frog" for the indentation on one bed of the brick is a word that often excites curiosity as to its origin. The most likely explanation is that brickmakers also call the block that is placed in the mould to form the indentation a frog. Modern brickmakers usually use plastic frogs but in the past they were made of wood. When these are wet and have clay on them they resemble the amphibious kind of frog and this is where they got their name. Over time this term also came to refer to the indentation left by them.

Use

Bricks are used for building, block paving and pavement. In the USA, brick pavement was found incapable of withstanding heavy traffic, but it is coming back into use as a method of traffic calming or as a decorative surface in pedestrian precincts. For example, in the early 1900s, most of the streets in the city of Grand Rapids, Michigan were paved with brick. Today, there are only about 20 blocks of brick paved streets remaining (totalling less than 0.5 percent of all the streets in the city limits).

Bricks in the metallurgy and glass industries are often used for lining furnaces, in particular refractory bricks such as silica, magnesia, chamotte and neutral (chromomagnesite) refractory bricks. This type of brick must have good thermal shock resistance, refractoriness under load, high melting point, and satisfactory porosity. There is a large refractory brick industry, especially in the United Kingdom, Japan, the United States, Belgium and the Netherlands.

In Northwest Europe, bricks have been used in construction for centuries. Until recently, almost all houses were built almost entirely from bricks. Although many houses are now built using a mixture of concrete blocks and other materials, many houses are skinned with a layer of bricks on the outside for aesthetic appeal.

Engineering bricks are used where strength, low water porosity or acid (flue gas) resistance are needed.

In the UK a redbrick university is one founded and built in the Victorian era, often as a technical college. The term serves to distinguish these polytechnic colleges from older, more classics-oriented universities.

Colombian architect Rogelio Salmona was noted for his extensive use of red brick in his buildings and for using natural shapes like spirals, radial geometry and curves in his designs. Most buildings in Colombia are made of brick, given the abundance of clay in equatorial countries like this one.

5. Дайте ответы на вопросы.

1. What building materials are described in the text?
2. What components are they made of?
3. Where are these building materials used?
4. Would you like to use these materials in the process of construction?

Текст №4

1. Прочитайте текст и ознакомьтесь с его содержанием.
2. Выпишите интернациональную лексику и переведите с помощью словаря.
3. Напишите аннотацию текста на русском языке.
4. Составьте реферат текста на русском языке.

Concrete

Concrete is a composite construction material, composed of cement (commonly Portland cement) and other cementitious materials such as fly ash and slag cement, aggregate (generally a coarse aggregate made of gravel or crushed rocks such as limestone, or granite, plus a fine aggregate such as sand), water and chemical admixtures.

The word concrete comes from the Latin word "concretus"(meaning compact or condensed), the perfect passive participle of "concrescere", from "con-" (together) and "crescere" (to grow).

Concrete solidifies and hardens after mixing with water and placement due to a chemical process known as hydration. The water reacts with the cement, which bonds the other components together, eventually creating a robust stone-like material.

Concrete is used to make pavements, pipe, architectural structures, foundations, motorways/roads, bridges/overpasses, parking structures, brick/block walls, footings for gates, fences and poles and even boats.

Concrete is used more than any other man-made material in the world. As of 2006, about 7.5 billion cubic meters of concrete are made each year – more than one cubic meter for every person on Earth. Concrete powers a US $ 35 billion industry, employing more than two million workers in the United States alone. More than 55,000 miles (89,000 km) of highways in the United States are paved with this material. Reinforced concrete, prestressed concrete and precast concrete are the most widely used types of concrete functional extensions in modern days. Outer view of the Roman Pantheon, still the largest unreinforced solid concrete dome

History

Concrete was used for construction in many ancient structures. During the Roman Empire, Roman concrete (or opus caementicium) was made from quicklime, pozzolana and an aggregate of pumice. Its widespread use in many Roman structures, a key event in the history of architecture termed the Roman Archi-tectural Revolution, freed Roman construction from the restrictions of stone and brick material and allowed for revolutionary new designs in terms of both structural complexity and dimension.

Hadrian's Pantheon in Rome is an example of Roman concrete construction.Concrete, as the Romans knew it, was a new and revolutionary material. Laid in the shape of arches, vaults and domes, it quickly hardened into a rigid mass, free from many of the internal thrusts and strains that troubled the builders of similar structures in stone or brick. Modern tests show that opus caementicium had as much compressive strength as modern Portland-cement concrete (ca. 200 kg/cm^2). However, due to the absence of steel reinforcement, its tensile strength was far lower and its mode of application was also different. Modern structural concrete differs from Roman concrete in two important details. First, its mix consistency is fluid and homogeneous, allowing it to be poured into forms rather than requiring hand-layering together with the placement of aggregate, which, in Roman practice, often consisted of rubble. Second, integral reinforcing steel gives modern concrete assemblies great strength in tension, whereas Roman concrete could depend only upon the strength of the concrete bonding to resist tension.

The widespread use of concrete in many Roman structures has ensured that many survive to the present day. The Baths of Caracalla in Rome are just one example. Many Roman aqueducts and bridges have masonry cladding on a concrete core, as does the dome of the Pantheon.

Some have stated that the secret of concrete was lost for 13 centuries until 1756, when the British engineer John Smeaton pioneered the use of hydraulic lime in concrete, using pebbles and powdered brick as aggregate. However, the Canal du Midi was built using concrete in 1670. Likewise there are concrete structures in Finland that date back to the 16th century. Portland cement was first used in concrete in the early 1840s.

Additives

Concrete additives have been used since Roman and Egyptian times, when it was discovered that adding volcanic ash to the mix allowed it to set under water. Similarly, the Romans knew that adding horse hair made concrete less liable to crack while it hardened and adding blood made it more frost-resistant.

Recently the use of recycled materials as concrete ingredients has been gaining popularity because of increasingly stringent environmental legislation. The most conspicuous of these is fly ash, a by-product of coal-fired power plants. This use reduces the amount of quarrying and landfill space required as the ash acts as a cement replacement thus reducing the amount of cement required.

In modern times, researchers have experimented with the addition of other materials to create concrete with improved properties, such as higher strength or electrical conductivity. Marconite is one example.

Composition

There are many types of concrete available, created by varying the proportions of the main ingredients below. In this way or by substitution for the cemetitious and aggregate phases, the finished product can be tailored to its application with varying strength, density, or chemical and thermal resistance properties.

The mix design depends on the type of structure being built, how the concrete will be mixed and delivered and how it will be placed to form this structure.

Cement

Portland cement is the most common type of cement in general usage. It is a basic ingredient of concrete, mortar and plaster. English masonry worker Joseph Aspdin patented Portland cement in 1824; it was named because of its similarity in color to Portland limestone, quarried from the English Isle of Portland and used extensively in London architecture. It consists of a mixture of oxides of calcium, silicon and aluminium. Portland cement and similar materials are made by heating limestone (a source of calcium) with clay and grinding this product (called clinker) with a source of sulfate (most commonly gypsum).

Water

Combining water with a cementitious material forms a cement paste by the process of hydration. The cement paste glues the aggregate together, fills voids within it and allows it to flow more freely. Less water in the cement paste will yield a stronger, more durable concrete; more water will give a freer-flowing concrete with a higher slump. Impure water used to make concrete can cause problems when setting or in causing premature failure of the structure.

Hydration involves many different reactions, often occurring at the same time. As the reactions proceed, the products of the cement hydration process gradually bond together the individual sand and gravel particles and other components of the concrete, to form a solid mass.

Reaction:

Cement chemist notation: C3S + H → C-S-H + CH

Standard notation: $Ca_3SiO_5 + H_2O \rightarrow (CaO){\bullet}(SiO_2){\bullet}(H_2O)(gel) + Ca(OH)_2$

Balanced: $2Ca_3SiO_5 + 7H_2O \rightarrow 3(CaO){\bullet}2(SiO_2){\bullet}4(H_2O)(gel) + 3Ca(OH)_2$

Recycled crushed concrete, to be reused as granular fill, is loaded into a semi-dump truck

Aggregates

Fine and coarse aggregates make up the bulk of a concrete mixture. Sand, natural gravel and crushed stone are used mainly for this purpose. Recycled aggregates (from construction, demolition and excavation waste) are increasingly used as partial replacements of natural aggregates, while a number of manufactured aggregates, including air cooled blast furnace slag and bottom ash are also permitted. Decorative stones such as quartzite, small river stones or crushed glass are sometimes added to the surface of concrete for a decorative "exposed aggregate" finish, popular among landscape designers.

The presence of aggregate greatly increases the robustness of concrete above hat of cement, which otherwise is a brittle material and thus concrete is a true composite material. Redistribution of aggregates after compaction often creates in homogeneity due to the influence of vibration. This can lead to strength gradients.

Rein for cement

Installing rebar in a floor slab during a concrete pour.

Concrete is strong in compression, as the aggregate efficiently carries the compression load. However, it is weak intension as the cement holding the aggregate in place can crack, allowing the structure to fail. Reinforced concrete solves these problems by adding either steel reinforcing bars, steel fibers, glass fiber, or plastic fiber to carry tensile loads. Thereafter the concrete is reinforced to withstand the tensile loads upon it.

Chemical admixtures

Chemical admixtures are materials in the form of powder or fluids that are added to the concrete to give it certain characteristics not obtainable with plain concrete mixes. In normal use, admixture dosages are less than 5% by mass of cement and are added to the concrete at the time of batching/mixing. The common types of admixtures areas follows.

•Accelerators speed up the hydration (hardening) of the concrete. Typical materials used are $CaCl_2$, $Ca(NO_3)_2$ and $NaNO_3$. However, use of chlorides may cause corrosion in steel reinforcing and is prohibited in some countries, so that nitrates may be favored.

•Retarders slow the hydration of concrete and are used in large or difficult pours where partial setting before the pour is complete is undesirable. Typical polyol retarders are sugar, sucrose, sodium gluconate, glucose, citric acid, and tartaric acid.

•Air entrainments add and entrain tiny air bubbles in the concrete, which will reduce damage during freeze-thaw cycles, thereby increasing the concrete's durability.

However, entrained air entails a trade off with strength, as each 1% of air may result in 5% decrease in compressive strength.

•Plasticizers increase the workability of plastic or "fresh" concrete, allowing it be placed more easily, with less consolidating effort. A typical plasticizer is ligno-sulfonate. Plasticizers can be used to reduce the water content of a concrete while maintaining workability and are sometimes called water-reducers due to this use. Such treatment improves its strength and durability characteristics. Superplasticizers (also called high-range water-reducers) are a class of plasticizers that have fewer deleterious effects and can be used to increase workability more than is practical with traditional plasticizers. Compounds used as superplasticizers include sulfonated naphthalene formal dehydecondensate, sulfonated melamine formal dehydecondensate, acetone formaldehyde condensate and polycarboxylateethers.

•Pigments can be used to change the color of concrete, for aesthetics.

•Corrosion inhibitors are used to minimize the corrosion of steel and steel bars in concrete.

•Bonding agents are used to create a bond between old and new concrete (typically a type of polymer).

•Pumping aids improve pumpability, thicken the paste and reduce separation and bleeding.

Mineral admixtures and blended cements

There are inorganic materials that also have pozzolanic or latent hydraulic properties. These very fine-grained materials are added to the concrete mix to improve the properties of concrete (mineral admixtures), or as are placement for Portland cement (blended cements).

•Fly ash: A by-product of coal-fired electric generating plants, it is used to partially replace Portland cement (by up to 60% by mass). The properties of fly ash depend on the type of coal burnt. In general, siliceous fly ash is pozzolanic, while calcareous fly ash has latent hydraulic properties.

•Ground granulated blast furnace slag (GGBFS or GGBS): A by-product of steel production is used to partially replace Portland cement (by up to 80% by mass). It has latent hydraulic properties.

•Silica fume: A by-product of the production of silicon and ferrosilicon alloys.

Silica fume is similar to fly ash, but has a particle size 100 times smaller. This results in a higher surface to volume ratio and a much faster pozzolanic reaction. Silica fume is used to increase strength and durability of concrete, but generally requires the use of superplasticizers for workability.

•High reactivity Metakaolin (HRM): Metakaolin produces concrete with strength and durability similar to concrete made with silica fume. While silica fume is usually dark gray or black in color, high-reactivity metakaolin is usually bright white in color, making it the preferred choice for architectural concrete where appearance is important.

Concrete production

Concrete plant facility (background) with concrete delivery trucks. The processes used vary dramatically, from hand tools to heavy industry, but result in the concrete being placed where it cures into a final form. Wide range of technological factors may occur during production of concrete elements and their influence to basic characteristics may vary.

When initially mixed together, Portland cement and water rapidly form a gel, formed of tangled chains of interlocking crystals. These continue to react over time, with the initially fluid gel often aiding in placement by improving workability.

As the concrete sets, the chains of crystals join and form a rigid structure, gluing the aggregate particles in place. During curing, more of the cement reacts with the residual water (hydration).

This curing process develops physical and chemical properties. Among these qualities are mechanical strength, low moisture permeability and chemical and volumetric stability. Concrete plant facility showing a Concrete mixer being filled from the ingredient silos.

Mixing concrete

Thorough mixing is essential for the production of uniform, high quality concrete. For this reason equipment and methods should be capable of effectively mixing concrete materials containing the largest specified aggregate to produce uniform mixtures of the lowest slump practical for the work.

Separate paste mixing has shown that the mixing of cement and water into a paste before combining these materials with aggregates can increase the compressive strength of the resulting concrete. The paste is generally mixed in a high-speed, shear-type mixer at a w/cm (water to cement ratio) of 0.30 to 0.45 by mass. The cement paste premix may include admixtures such as accelerators or retarders, superplasticizers, pigments, or silica fume. The premixed paste is then blended with aggregates and any remaining batch water and final mixing is completed in conventional concrete mixing equipment.

High-energy mixed (HEM) concrete is produced by means of high-speed mixing of cement, water and sand with net specific energy consumption of at least 5 kilo-joules per kilogram of the mix. A plasticizer or a superplasticizer is then added to the activated mixture, which can later be mixed with aggregates in a conventional concrete mixer. In this process, sand provides dissipation of energy and creates high shear conditions on the surface of cement particles. This results in the full volume of water interacting with cement. The liquid activated mixture can be used by itself or foamed (expanded) for lightweight concrete. HEM concrete hardens in low and subzero temperature conditions and possesses an increased volume of gel, which drastically reduces capillarity in solid and porous materials.

Workability

Workability is the ability of a fresh (plastic) concrete mix to fill the form/mold properly with the desired work (vibration) and without reducing the concrete's quality. Workability depends on water content, aggregate (shape and size distribution), cementitious content and age (level of hydration) and can be modified by adding chemical admixtures, like superplasticizer. Raising the water content or adding chemical admixtures will increase concrete workability. Excessive water will lead to increased bleeding (surface water) and/or segregation of aggregates (when the cement and aggregates start to separate), with the resulting concrete having reduced quality. The use of an aggregate with an undesirable gradation can result in a very harsh mix design with a very low slump, which cannot be readily made more workable by addition of reasonable amounts of water.

Workability can be measured by the concrete slump test, a simplistic measure of the plasticity of a fresh batch of concrete following the ASTM C 143 or EN 12350-2 test standards. Slump is normally measured by filling an "Abramscone" with a sample from a fresh batch of concrete. The cone is placed with the wide end down onto a level, non-absorptive surface. It is then filled in three layers of equal volume, with each layer being tamped with a steel rod in order to consolidate the layer. When the cone is carefully lifted off, the enclosed material will slump a certain amount due to gravity. A relatively dry sample will slump very little, having a slump value of one or two inches (25 or 50 mm).A relatively wet concrete sample may slump as much as eight inches. Workability can also be measured by using the flow table test. Slump can be increased by addition of chemical admixtures such as plasticizer or superplasticizer without changing the water-cement ratio. Some other admixtures, especially air-entraining admixture, can increase the slump of a mix. High-flow concrete, like self-consolidating concrete, is tested by other flow-measuring methods. One of these methods includes placing the cone on the narrow end and observing how the mix flows through the cone while it is gradually lifted. After mixing, concrete is a fluid and can be pumped to the location where needed.

Curing

In all but the least critical applications, care needs to be taken to properly cure concrete, to achieve best strength and hardness. This happens after the concrete has been placed. Cement requires a moist, controlled environment to gain strength and harden fully. The cement paste hardens over time, initially setting and becoming rigid though very weak and gaining in strength in the weeks following. In around 3 weeks, typically over 90% of the final strength is reached, though strengthening may continue for decades. The conversion of calcium hydroxide in the concrete into calcium carbonate from absorption of CO2 over several decades further strengthen the concrete and making it more resilient to damage. However, this reaction, called carbonation, lowers the pH of the cement pore solution and can cause there in for cement bars to corrode.

Hydration and hardening of concrete during the first three days is critical. Abnormally fast drying and shrinkage due to factors such as evaporation from wind during placement may lead to increased tensile stresses at a time when it has not yet gained sufficient strength, resulting in greater shrinkage cracking. The early strength of the concrete can be increased if it is kept damp during the curing process. Minimizing stress prior to curing minimizes cracking. High-early-strength concrete is designed to hydrate faster, often by increased use of cement that increases shrinkage and cracking. Strength of concrete changes (increases) up to three years. It depends on cross-section dimension of elements and conditions of structure exploitation.

During this period concrete needs to be kept under controlled temperature and humid atmosphere. In practice, this is achieved by spraying or ponding the concrete surface with water, thereby protecting the concrete mass from ill effects of ambient conditions. (The pictures to the right show two of many ways to achieve this, ponding – submerging setting concrete in water and wrapping in plastic to contain the water in the mix). Additional common curing methods include wet burlap and/or plastic sheeting covering the fresh concrete, or by spraying on a water-impermeable temporary curing membrane.

Properly curing concrete leads to increased strength and lower permeability and avoids cracking where the surface dries out prematurely. Care must also be taken to avoid freezing, or overheating due to the exothermic setting of cement. Improper curing can cause scaling, reduced strength, poor abrasion resistance and cracking.

Properties

Concrete has relatively high compressive strength, but much lower tensile strength. For this reason is usually reinforced with materials that are strong in tension (often steel). The elasticity of concrete is relatively constant at low stress levels but starts decreasing at higher stress levels as matrix cracking develops. Concrete has a very low coefficient of thermal expansion and shrinks as it matures. All concrete structures will crack to some extent, due to shrinkage and tension. Concrete that is subjected to long-duration forces is prone to creep. Tests can be made to ensure the properties of concrete correspond to specifications for the application.

Surface runoff

Surface runoff, when water runs off impervious surfaces, such as non-porous concrete, can cause heavy soil erosion and flooding. Urban runoff tends to pick up gasoline, motor oil, heavy metals, trash and other pollutants from sidewalks, roadways and parking lots. Without attenuation, the impervious cover in a typical urban area limits groundwater percolation and causes five times the amount of runoff generated by a typical woodland of the same size. A 2008 report by the United States National Research Council identified urban runoff as a leading source of water quality problems.

Urban heat

Both concrete and asphalt are the primary contributors to what is known as the urban heat island effect.

Using light-colored concrete has proven effective in reflecting up to 50% more light than asphalt and reducing ambient temperature. A low albedo value, characteristic of black asphalt, absorbs a large percentage of solar heat and contributes to the warming of cities. By paving with light colored concrete, in addition to replacing asphalt with light-colored concrete, communities can lower their average temperature.

In many U.S. cities, pavement covers about 30–40% of the surface area. This directly affects the temperature of the city and contributes to the urban heat island effect. Paving with light-colored concrete would lower temperatures of paved areas and improve night-time visibility. The potential of energy saving within an area is also high. With lower temperatures, the demand for air conditioning decreases, saving energy.

Atlanta has tried to mitigate the heat-island effect. City officials noted that when using heat-reflecting concrete, their average city temperature decreased by 6°F (3.3°C). The Design Trust for Public Space found that by slightly raising the albedo value in New York City, beneficial effects such as energy savings could be achieved. It was concluded that this could be accomplished by the replacement of black asphalt with light-colored concrete.

However, in winter this may be a disadvantage as ice will form more easily and remain longer on the light colored surfaces as they will be colder due to less energy absorbed from the reduced amount of sunlight in winter.

Concrete dust

Building demolition and natural disasters such as earthquakes often release a large amount of concrete dust into the local atmosphere. Concrete dust was concluded to be the major source of dangerous air pollution following the Great Hanshin earth-quake.

Toxic and radioactive contamination

The presence of some substances in concrete, including useful and unwanted additives, can cause health concerns. Natural radioactive elements (K, U and Th) can be present in various concentration in concrete dwellings, depending on the source of the raw materials used. Toxic substances may also be added to the mixture for making concrete by unscrupulous makers. Dust from rubble or broken concrete upon demolition or crumbling may cause serious health concerns depending also on what had been incorporated in the concrete.

Handling precautions

Handling of wet concrete must always be done with proper protective equipment. Contact with wet concrete can cause skin chemical burns due to the caustic nature of the mixture of cement and water. Indeed, the pH of fresh cement water is highly alkaline due to the presence of free potassium and sodium hydroxides in solution (pH ~ 13.5). Eyes, hands and feet must be correctly protected to avoid any direct contact with wet concrete and washed without delay if necessary.

Concrete recycling

Recycled crushed concrete being loaded into a semi-dump truck to be used as granular fill.

Concrete recycling is an increasingly common method of disposing of concrete structures. Concrete debris was once routinely shipped to landfills for disposal, but recycling is increasing due to improved environmental awareness, governmental laws and economic benefits.

Concrete, which must be free of trash, wood, paper and other such materials, is collected from demolition sites and put through a crushing machine, often along with asphalt, bricks and rocks.

Reinforced concrete contains rebar and other metallic reinforcements, which are removed with magnets and recycled elsewhere. The remaining aggregate chunks are sorted by size. Larger chunks may go through the crusher again. Smaller pieces of concrete are used as gravel for new construction projects. Aggregate base gravel is laid down as the lowest layer in a road, with fresh concrete or asphalt placed over it.

Crushed recycled concrete can sometimes be used as the dry aggregate for brand new concrete if it is free of contaminants, though the use of recycled concrete limits strength and is not allowed in many jurisdictions. On 3 March 1983, a government funded research team (the VIRL research.codep) approximated that almost 17% of worldwide land fill was by-products of concrete based waste.

World records

The world record for the largest concrete pour in a single project is the

Three Gorges Dam in Hubei Province, China by the Three Gorges Corporation. The amount of concrete used in the construction of the dam is estimated at 16 million cubic meters over 17 years. The previous record was 3.2 million cubic meters held by Itaipu hydropower station in Brazil.

Mass concrete structures

These large structures typically include gravity dams, such as the Hoover Dam, the Itaipu Dam and the Three Gorges Dam, arch dams, navigation locks and large breakwaters. Such large structures, even though individually placed informed horizontal blocks, generate excessive heat and associated expansion; to mitigate these effects post-cooling is commonly provided in the design. An early example at Hoover Dam, installed a network of pipes between vertical concrete placements to circulate cooling water during the curing process to avoid damaging overheating. Similar systems are still used; depending on volume of the pour, the concrete mix used, and ambient air-temperature, the cooling process may last for many months after the concrete is placed. Various methods also are used to pre-cool the concrete mix in mass concrete structures. Concrete that is poured all at once in one form (so that there are no weak points where the concrete is "welded" together) is used for tornado shelters.

Prestressed concrete is a form of reinforced concrete that builds in compressive stresses during construction to oppose those found when in use. This can greatly re-duce the weight of beams or slabs, by better distributing the stresses in the structure to make optimal use of the reinforcement. For example a horizontal beam will tend to sag down. If the reinforcement along the bottom of the beam is pre-stressed, it can counteract this. In pre-tensioned concrete, the prestressing is achieved by using steel or polymer tendons or bars that are subjected to a tensile force prior to casting, or for post-tensioned concrete, after casting. Pouring and smoothing out concrete at Palisades Park in Washington DC.

Concrete textures

When one thinks of concrete, the image of a dull, gray concrete wall often comes to mind. With the use of form liner, concrete can be cast and molded into different textures and used for decorative concrete applications. Sound/retaining walls, bridges, office buildings and more serve as the optimal canvases for concrete art. For example, the Pima Freeway/Loop 101 retaining and sound walls in Scottsdale, Arizona, feature desert flora and fauna, a 67-foot (20 m) lizard and 40-foot (12 m) cacti along the 8-mile (13 km) stretch. The project, titled "The Path Most Traveled", is one example of how concrete can be shaped using elastomeric form liner.

Building with concrete

Concrete is one of the most durable building materials. It provides superior fire resistance, compared with wooden construction and can gain strength over time. Structures made of concrete can have a long service life. Concrete is the most widely used construction material in the world with annual consumption estimated at between 21 and 31 billion tons.

Energy efficiency

Energy requirements for transportation of concrete are low because it is produced locally from local resources, typically manufactured within 100 kilometers of the job site. Once in place, concrete offers significant energy efficiency over the lifetime of a building. Concrete walls leak air far less than those made of wood-frames. Air leakage accounts for a large percentage of energy loss from a home. The thermal mass properties of concrete increase the efficiency of both residential and commercial buildings. By storing and releasing the energy needed for heating or cooling, concrete's thermal mass delivers year-round benefits by reducing temperature swings inside and minimizing heating and cooling costs. While insulation reduces energy loss through the building envelope, thermal mass uses walls to store and release energy. Modern concrete wall systems use both insulation and thermal mass to create an energy-efficient building. Insulating Concrete Forms (ICFs) are hollow blocks or panels made of either rinsulating foam or rastra that are stacked to form the shape of the walls of a building and then filled with reinforced concrete to create the structure.

Fire safety

Concrete buildings are more resistant to fire than those constructed using wood or steel frames, since concrete does not burn. Concrete reduces the risk of structural collapse and is an effective fire shield, providing safe means of escape for occupants and protection for fire fighters.

Options for non-combustible construction include floors, ceilings and roofs made of cast-in-place and hollow-core precast concrete. For walls, concrete masonry technology and Insulating Concrete Forms (ICFs) are additional options. ICFs are hollow blocks or panels made of fire-proof insulating foam that are stacked to form the shape of the walls of a building and then filled with reinforced concrete to create the structure.

Concrete also provides the best resistance of any building material to high winds, hurricanes, tornadoes due to its lateral stiffness that results in minimal horizontal movement.

Earthquake safety

As discussed above, concrete is very strong in compression, but weak in tension. Larger earthquakes can generate very large shear loads on structures. These shear loads subject the structure to both tensional and compressional loads. Concrete structures without reinforcing, like other unreinforced masonry structures, can fail during severe earthquake shaking. Unreinforced masonry structures constitute one of the largest earthquake risks globally. These risks can be reduced through seismic retrofitting of at-risk buildings, (e.g. School buildings in Istanbul, Turkey).

5. Дайте ответы на вопросы.

1. What building materials are described in the text?
2. What components are they made of?
3. Where are these building materials used?
4. Would you like to use these materials in the process of construction?

Текст №5

1. Прочитайте текст и ознакомьтесь с его содержанием.
2. Выпишите интернациональную лексику и переведите с помощью словаря.
3. Напишите аннотацию текста на русском языке.
4. Составьте реферат текста на русском языке.

Cement

A **cement** is a binder, a substance that sets and hardens and can bind other materials together. The word "cement" traces to the Romans, who used the term *opus caementicium* to describe masonry resembling modern concrete that was made from crushed rock with burnt lime as binder. The volcanic ash and pulverized brick supplements that were added to the burnt lime, to obtain a hydraulic binder, were later referred to as *cementum*, *cimentum*, *cäment*, and *cement*.

Cements used in construction can be characterized as being either **hydraulic** or **non-hydraulic**, depending upon the ability of the cement to be used in the presence of water.

Non-hydraulic cement will not set in wet conditions or underwater, it sets as the cement dries and reacts with carbon dioxide in the air. It can be attacked by some aggressive chemicals after setting.

Hydraulic cement is made by replacing some of the cement in a mix with activated aluminium silicates, pozzolanas, such as fly ash. This allows setting in wet condition or underwater and further protects the hardened material from chemical attack (*e.g.,* Portland cement).

The chemical process for hydraulic cement found by ancient Romans used volcanic ash (activated aluminium silicates). Presently cheaper than volcanic ash, fly ash from power stations, recovered as a pollution control measure, or other waste or by products are used as pozzolanas with plain cement to produce hydraulic cement. Pozzolanas can constitute up to 40% of Portland cement.

Hydraulic cement can harden underwater or when constantly exposed to wet weather. The chemical reaction results in hydrates that are not very water-soluble and so are quite durable in water and safe from chemical attack.

The most important uses of cement are as a component in the production of mortar in masonry, and of concrete, a combination of cement and an aggregate to form a strong building material.

Cements before the 18th century

An early version of cement made with lime, sand, and gravel was used in Mesopotamia in the third millennium B.C. and later in Egypt. It is uncertain where it was first discovered that a combination of hydrated non-hydraulic lime and a pozzolan produces a hydraulic mixture (see also: Pozzolanic reaction), but concrete made from such mixtures was used by the Ancient Macedonians and three centuries later on a large scale by Roman engineers. They used both natural pozzolans (trass or pumice) and artificial pozzolans (ground brick or pottery) in these concretes. The huge dome of the Pantheon in Rome and the massive Baths of Caracalla are examples of ancient structures made from these concretes, many of which are still standing. The vast system of Roman aqueducts also made extensive use of hydraulic cement. Although any preservation of this knowledge in literary sources from the Middle Ages is unknown, medieval masons and some military engineers maintained an active tradition of using hydraulic cement in structures such as canals, fortresses, harbors, and shipbuilding facilities. This technical knowledge of making hydraulic cement was later formalized by French and British engineers in the 18th century.

Cement is usually a grey powder before being mixed with other materials and water. Cement powder causes allergic reactions at skin contact and is biohazardous to skin, eyes and lungs, so handlers should wear a dust mask, goggles and protective gloves

Cements in the 18th, 19th, and 20th centuries

John Smeaton made an important contribution to the development of cements when he was planning the construction of the third Eddystone Lighthouse (1755–59) in the English Channel now known as Smeaton's Tower. He needed a hydraulic mortar that would set and develop some strength in the twelve hour period between successive high tides. He performed experiments with combinations of different limestones and additives including trass and pozzolanas and did exhaustive market research on the available hydraulic limes, visiting their production sites, and noted that the "hydraulicity" of the lime was directly related to the clay content of the limestone from which it was made. Smeaton was a civil engineer by profession, and took the idea no further.

In Britain particularly, good quality building stone became ever more expensive during a period of rapid growth, and it became a common practice to construct prestige buildings from the new industrial bricks, and to finish them with a stucco to imitate stone. Hydraulic limes were favored for this, but the need for a fast set time encouraged the development of new cements. Most famous was Parker's "Roman cement". This was developed by James Parker in the 1780s, and finally patented in 1796. It was, in fact, nothing like material used by the Romans, but was a "natural cement" made by burning septaria – nodules that are found in certain clay deposits, and that contain both clay minerals and calcium carbonate. The burnt nodules were ground to a fine powder. This product, made into a mortar with sand, set in 5–15 minutes. The success of "Roman cement" led other manufacturers to develop rival products by burning artificial hydraulic lime cements of clay and chalk. Roman cement quickly became popular but was largely replaced by Portland cement in the 1850s.

In Russia, Egor Cheliev created a new binder by mixing lime and clay. His results were published in 1822 in his book *A Treatise on the Art to Prepare a Good Mortar* published in St. Petersburg. A few years later in 1825, he published another book, which described the various methods of making cement and concrete, as well as the benefits of cement in the construction of buildings and embankments.

Apparently unaware of Smeaton's work, the same principle was identified by Frenchman Louis Vicat in the first decade of the nineteenth century. Vicat went on to devise a method of combining chalk and clay into an intimate mixture, and, burning this, produced an "artificial cement" in 1817 considered the "principal forerunner" of Portland cement and "...Edgar Dobbs of Southwark patented a cement of this kind in 1811."

James Frost, working in Britain, produced what he called "British cement" in a similar manner around the same time, but did not obtain a patent until 1822. In 1824, Joseph Aspdin patented a similar material, which he called *Portland cement*, because the render made from it was in color similar to the prestigious Portland stone. However, Aspdins' cement was nothing like modern Portland cement but was a first step in its development, called a *proto-Portland cement*. Joseph Aspdins' son William Aspdin had left his father's company and in his cement manufacturing apparently accidentally produced calcium silicates in the 1840s, a middle step in the development of Portland cement. William Aspdin's innovation was counterintuitive for manufacturers of "artificial cements", because they required more lime in the mix (a problem for his father), a much higher kiln temperature (and therefore more fuel), and the resulting clinker was very hard and rapidly wore down the millstones, which were the only available grinding technology of the time. Manufacturing costs were therefore considerably higher, but the product set reasonably slowly and developed strength quickly, thus opening up a market for use in concrete. The use of concrete in construction grew rapidly from 1850 onward, and was soon the dominant use for cements. Thus Portland cement began its predominant role.

Isaac Charles Johnson further refined the production of *meso-Portland cement* (middle stage of development) and claimed to be the real father of Portland cement.

Setting time and "early strength" are important characteristics of cements. Hydraulic limes, "natural" cements, and "artificial" cements all rely upon their belite content for strength development. Belite develops strength slowly. Because they were burned at temperatures below 1,250 °C (2,280 °F), they contained no alite, which is responsible for early strength in modern cements. The first cement to consistently contain alite was made by William Aspdin in the early 1840s: This was what we call today "modern" Portland cement. Because of the air of mystery with which William Aspdin surrounded his product, others (*e.g.,* Vicat and Johnson) have claimed precedence in this invention, but recent analysis of both his concrete and raw cement have shown that William Aspdin's product made at Northfleet, Kent was a true alite-based cement. However, Aspdin's methods were "rule-of-thumb": Vicat is responsible for establishing the chemical basis of these cements, and Johnson established the importance of sintering the mix in the kiln.

Sorel cement was patented in 1867 by Frenchman Stanislas Sorel and was stronger than Portland cement but its poor water restive and corrosive qualities limited its use in building construction. The next development with the manufacture of Portland cement was the introduction of the rotary kiln which allowed a stronger, more homogeneous mixture and a continuous manufacturing process.

rotary Kiln

Also, tabby, a wall building method using lime, sand and oyster shells to form a concrete, was introduced to the Americas by the Spanish in the sixteenth century. The lime may have been made from burned oyster shells which were available in some coastal areas in the form of shell middens. Calcium aluminate cements were patented in 1908 in France by Jules Bied for better resistance to sulfates.

In the US the first large-scale use of cement was Rosendale cement, a natural cement mined from a massive deposit of a large dolostone rock deposit discovered in the early 19th century near Rosendale, New York. Rosendale cement was extremely popular for the foundation of buildings (*e.g.*, Statue of Liberty, Capitol Building, Brooklyn Bridge) and lining water pipes. But its long curing time of at least a month made it unpopular after World War One in the construction of highways and bridges and many states and construction firms turned to the use of Portland cement. Because of the switch to Portland cement, by the end of the 1920s of the 15 Rosendale cement companies, only one had survived. But in the early 1930s it was discovered that, while Portland cement had a faster setting time it was not as durable, especially for highways, to the point that some states stopped building highways and roads with cement. Bertrain H. Wait, an engineer whose company had worked on the construction of the New York City's Catskill Aqueduct, was impressed with the durability of Rosendale cement, and came up with a blend of both Rosendale and synthetic cements which had the good attributes of both: it was highly durable and had a much faster setting time. Mr. Wait convinced the New York Commissioner of Highways to construct an experimental section of highway near New Paltz, New York, using one sack of Rosendale to six sacks of synthetic cement. It was proved a success and for decades the Rosendale-synthetic cement blend became common use in highway and bridge construction.

Portland cement

Portland cement is by far the most common type of cement in general use around the world. This cement is made by heating limestone (calcium carbonate) with small quantities of other materials (such as clay) to 1450 °C in a kiln, in a process known ascalcination, whereby a molecule of carbon dioxide is liberated from the calcium carbonate to form calcium oxide, or quicklime, which is then blended with the other materials that have been included in the mix. The resulting hard substance, called 'clinker', is then ground with a small amount of gypsum into a powder to make 'Ordinary Portland Cement', the most commonly used type of cement (often referred to as OPC). Portland cement is a basic ingredient of concrete, mortar and most non-specialty grout. The most common use for Portland cement is in the production of concrete. Concrete is a composite material consisting of aggregate (gravel and sand), cement, and water. As a construction material, concrete can be cast in almost any shape desired, and once hardened, can become a structural (load bearing) element. Portland cement may be grey or white.

In 2010, the world production of hydraulic cement was 3,300 million tons. The top three producers were China with 1,800, India with 220, and USA with 63.5 million tons for a combined total of over half the world total by the world's three most populated states.

For the world capacity to produce cement in 2010, the situation was similar with the top three states (China, India, and USA) accounting for just under half the world total capacity.

Over 2011 and 2012, global consumption continued to climb, rising to 3585 Mt in 2011 and 3736 Mt in 2012, while annual growth rates eased to 8.3% and 4.2%, respectively.

China, representing an increasing share of world cement consumption, continued to be the main engine of global growth. By 2012, Chinese demand was recorded at 2160 Mt, representing 58% of world consumption. Annual growth rates, which reached 16% in 2010, appear to have softened, slowing to 5–6% over 2011 and 2012, as China's economy targets a more sustainable growth rate.

Outside of China, worldwide consumption climbed by 4.4% to 1462 Mt in 2010, 5% to 1535 Mt in 2011, and finally 2.7% to 1576 Mt in 2012.

Iran is now the 3rd largest cement producer in the world and has increased its output by over 10% from 2008 to 2011. Due to climbing energy costs in Pakistan and other major cement-producing countries, Iran is a unique position as a trading partner, utilizing its own surplus petroleum to power clinker plants. Now a top producer in the Middle-East, Iran is further increasing its dominant position in local markets and abroad.

The performance in North America and Europe over the 2010–12 period contrasted strikingly with that of China, as the global financial crisis evolved into a sovereign debt crisis for many economies in this region and recession. Cement consumption levels for this region fell by 1.9% in 2010 to 445 Mt, recovered by 4.9% in 2011, then dipped again by 1.1% in 2012.

The performance in the rest of the world, which includes many emerging economies in Asia, Africa and Latin America and representing some 1020 Mt cement demand in 2010, was positive and more than offset the declines in North America and Europe. Annual consumption growth was recorded at 7.4% in 2010, moderating to 5.1% and 4.3% in 2011 and 2012, respectively.

As at year-end 2012, the global cement industry consisted of 5673 cement production facilities, including both integrated and grinding, of which 3900 were located in China and 1773 in the rest of the world.

Total cement capacity worldwide was recorded at 5245 Mt in 2012, with 2950 Mt located in China and 2295 Mt in the rest of the world.

Use of alternative fuels and by-products materials

A cement plant consumes 3 to 6 GJ of fuel per ton of clinker produced, depending on the raw materials and the process used. Most cement kilns today use coal and petroleum coke as primary fuels, and to a lesser extent natural gas and fuel oil. Selected waste and by-products with recoverable calorific value can be used as fuels in a cement kiln (referred to as co-processing), replacing a portion of conventional fossil fuels, like coal, if they meet strict specifications. Selected waste and by-products containing useful minerals such as calcium, silica, alumina, and iron can be used as raw materials in the kiln, replacing raw materials such as clay, shale, and limestone. Because some materials have both useful mineral content and recoverable calorific value, the distinction between alternative fuels and raw materials is not always clear. For example, sewage sludge has a low but significant calorific value, and burns to give ash containing minerals useful in the clinker matrix.

Normal operation of cement kilns provides combustion conditions which are more than adequate for the destruction of even the most difficult to destroy organic substances. This is primarily due to the very high temperatures of the kiln gases (2000 °C in the combustion gas from the main burners and 1100 °C in the gas from the burners in the precalciner). The gas residence time at high temperature in the rotary kiln is of the order of 5–10 seconds and in the precalciner more than 3 seconds.

Due to bovine spongiform encephalopathy (BSE) in the European beef industry, the use of animal-derived products to feed cattle is now severely restricted. Large quantities of waste animal meat and bone meal (MBM), also known as animal flour, have to be safely disposed of or transformed. The production of cement kilns, together with the incineration, is to date one of the two main ways to treat this solid effluent of the food industry.

5. Дайте ответы на вопросы.

1. What building materials are described in the text?
2. What components are they made of?
3. Where are these building materials used?
4. Would you like to use these materials in the process of construction

Часть II. ТЕКСТЫ ДЛЯ УСТНЫХ СООБЩЕНИЙ

Текст №6

1. Прочитайте текст и ознакомьтесь с его содержанием.
2. Выпишите интернациональную лексику и переведите с помощью словаря.
3. Напишите аннотацию текста на русском языке.
4. Составьте реферат текста на русском языке.
5. Подготовьте устное сообщение на английском языке, используя материалы текста.

Masonry

Masonry is the building of structures from individual units laid in and bound together by mortar; the term *masonry* can also refer to the units themselves. The common materials of masonry construction are brick, stone, marble, granite, travertine, limestone; concrete block, glass block, stucco, and tile. Masonry is generally a highlydurable form of construction. However, the materials used, the quality of the mortar and workmanship, and the pattern in which the units are assembled can significantly affect the durability of the overall masonry construction.

Masonry units, such as brick, tile, stone, glass brick or concrete block generally conform to the requirements specified in the 2003 International Building Code (IBC) Section 2103.

Applications

Masonry is commonly used for the walls of buildings, retaining walls and monuments. Brick and concrete block are the most common types of masonry in use in industrialized nations and may be either weight-bearing or a veneer. Concrete blocks, especially those with hollow cores, offer various possibilities in masonry construction. They generally provide great compressive strength, and are best suited to structures with light transverse loading when the cores remain unfilled. Filling some or all of the cores with concrete or concrete with steel reinforcement (typically rebar) offers much greater tensile and lateral strength to structures.

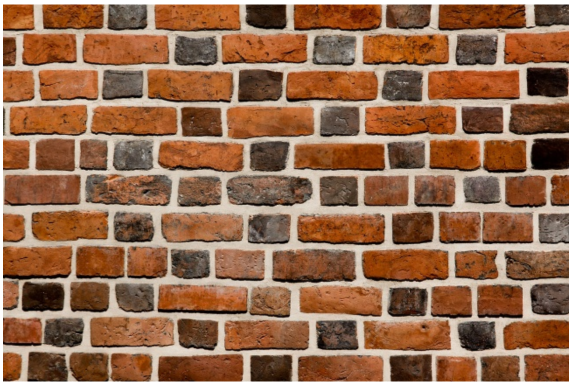
Advantages

- The use of materials such as brick and stone can increase the thermal mass of a building.

- Brick typically will not require painting and so can provide a structure with reduced life-cycle costs.
- Masonry is very heat resistant and thus provides good fire protection.
- Masonry walls are more resistant to projectiles, such as debris from hurricanes or tornadoes.
- Masonry structures built in compression preferably with lime mortar can have a useful life of more than 500 years as compared to 30 to 100 for structures of steel or reinforced concrete.

Disadvantages

- Extreme weather causes degradation of masonry wall surfaces due to frost damage.
- This type of damage is common with certain types of brick, though rare with concrete blocks.
- Masonry tends to be heavy and must be built upon a strong foundation, such as reinforced concrete, to avoid settling and cracking.
- Not suitable for habitat in tropical climate having heavy heat and rain conditions.



A wall constructed in glazed-headed Flemish bond with bricks of various shades and lengths

Structural limitations

Masonry boasts an impressive compressive strength (vertical loads) but is much lower in tensile strength (twisting or stretching) unless reinforced. The tensile strength of masonry walls can be strengthened by thickening the wall, or by building masonry *piers* (vertical columns or ribs) at intervals. Where practical, steel reinforcements can be added.

Veneer masonry

A masonry veneer wall consists of masonry units, usually clay-based bricks, installed on one or both sides of a structurally independent wall usually constructed of wood or masonry. In this context the brick masonry is primarily decorative, not structural. The brick veneer is generally connected to the structural wall by brick ties (metal strips that are attached to the structural wall, as well as the mortar joints of the brick veneer). There is typically an air gap between the brick veneer and the structural wall. As clay based brick is usually not completely waterproof, the structural wall will often have a water-resistant surface (usually tar paper) and weep holes can be left at the base of the brick veneer to drain moisture that accumulates inside the air gap. Concrete blocks, real and cultured stones, and veneer adobe are sometimes used in a very similar veneer fashion.

Most insulated buildings that utilize concrete block, brick, adobe, stone, veneers or some combination there of feature interior insulation in the form of fiberglass batts between wooden wall studs or in the form of rigid insulation boards covered with plaster or drywall. In most climates this insulation is much more effective on the exterior of the wall, allowing the building interior to take advantage of the aforementioned thermal mass of the masonry. This technique does, however, require some sort of weather-resistant exterior surface over the insulation and, consequently, is generally more expensive.

Dry set masonry

The strength of a masonry wall is not entirely dependent on the bond between the building material and the mortar; the friction between the interlocking blocks of masonry is often strong enough to provide a great deal of strength on its own. The blocks sometimes have grooves or other surface features added to enhance this inter-locking, and some dryset masonry structures forgo mortar altogether.

Solid masonry

Solid masonry, without steel reinforcement, tends to have very limited applications in modern wall construction. While such walls can be quite economical and suitable in some applications. Solid unreinforced masonry walls tend to be low and thick as a consequence.

Dry set masonry supports a rustic log bridge, where it provides a well-drained support for the log (which will increase its service life)

Brick

Solid brickwork is made of two or more layers of bricks with the units running horizontally (called stretcher bricks) bound together with bricks running transverse to the wall (called "header" bricks). Each row of bricks is known as a course. The pattern of headers and stretchers employed gives rise to different bonds such as the common bond (with every sixth course composed of headers), the English bond, and the Flemish bond (with alternating stretcher and header bricks present on every course). Bonds can differ in strength and in insulating ability. Vertically staggered bonds tend to be somewhat stronger and less prone to major cracking than a non staggered bond.

Uniformity and rusticity

Masonry repair work done to a brick wall.

The wide selection of brick styles and types generally available in industrialized nations allow much variety in the appearance of the final product. In buildings built during the 1950s-1970s, a high degree of uniformity of brick and accuracy in masonry was typical. In the period since then this style was thought to be too sterile, so attempts were made to emulate older, rougher work. Some brick surfaces are made to look particularly rustic by including burnt bricks, which have a darker color or an irregular shape. Others may use antique salvage bricks, or new bricks may be artificially aged by applying various surface treatments, such as tumbling.

The attempts at rusticity of the late 20th century have been carried forward by masons specializing in a free, artistic style, where the courses are intentionally not straight, instead weaving to form more organic impressions.

Serpentine masonry

A crinkle-crackle wall is a brick wall that follows a serpentine path, rather than a straight line. This type of wall is more resistant to toppling than a straight wall; so much so that it may be made of a single thickness of unreinforced brick and so despite its longer length may be more economical than a straight wall.

Concrete block

Concrete masonry units (CMUs) or blocks in a basement wall before burial. Blocks of cinder concrete (cinder blocks or breeze blocks), ordinary concrete (concrete blocks), or hollow tile are generically known as Concrete Masonry Units (CMUs). They usually are much larger than ordinary bricks and so are much faster to lay for a wall of a given size.

Furthermore, cinder and concrete blocks typically have much lower water absorption rates than brick. They often are used as the structural core for veneered brick masonry, or are used alone for the walls of factories, garages and other industrial-style buildings where such appearance is acceptable or desirable. Such blocks often receive a stucco surface for decoration.

Surface-bonding cement, which contains synthetic fibers for reinforcement, is sometimes used in this application and can impart extra strength to a block wall. Surface-bonding cement is often pre-coloured and can be stained or painted thus resulting in a finished stucco-like surface.

The primary structural advantage of concrete blocks in comparison to smaller clay-based bricks is that a CMU wall can be reinforced by filling the block voids with concrete with or without steel rebar. Generally, certain voids are designated for filling and reinforcement, particularly at corners, wall-ends, and openings while other voids are leftempty. This increases wall strength and stability more economically than filling and reinforcing all voids. Typically, structures made of CMUs will have the top course of blocks in the walls filled with concrete and tied together with steel reinforcement to form a bond beam. Bond beams are often a requirement of modern building codes and controls. Another type of steel reinforcement, referred to as ladder-reinforcement, can also be embedded in horizontal mortar joints of concrete block walls. The introduction of steel reinforcement generally results in a CMU wall having much greater lateral and tensile strength than unreinforced walls.

CMUs can be manufactured to provide a variety of surface appearances. They can be colored during manufacturing or stained or painted after installation.

They can be split as part of the manufacturing process, giving the blocks a rough face replicating the appearance of natural stone, such as brown stone. CMUs may also be scored, ribbed, sand blasted, polished, striated (raked or brushed), include decorative aggregates, be allowed to slump in a controlled fashion during curing, or include several of these techniques in their manufacture to provide a decorative appearance.

"Glazed concrete masonry units are manufactured by bonding a permanent colored facing (typically composed of polyester resins, silica sand and various other chemicals) to a concrete masonry unit, providing a smooth impervious surface."

Glass block or glass brick are blocks made from glass and provide a translucent to clear vision through the block.

A-Jacks

A-jacks (used in erosion control walls and sea walls) are highly stable, concrete 6-pronged armor units designed to interlock into a flexible, highly permeable matrix. They can be installed either randomly or in a uniform pattern. They look like giant 3-foot versions of the metal jacks that children play with.

In the uniform placement pattern, each unit is in contact with the six adjacent units, providing high stability. They are patterned after the bucky ball model.

Stonework

• Stone blocks used in masonry can be dressed or rough.

• Stone masonry utilizing dressed stones is known as ashlar masonry, whereas masonry using irregularly shaped stones is known as rubble masonry. Both rubble and ashlar masonry can be laid in courses rows of even height through the careful selection or cutting of stones, but a great deal of stone masonry is uncoursed.

• Slip form stone masonry produces a hybrid wall of reinforced concrete with a rubble stone face.

• Natural stone veneers over CMU, cast-in-place, or tilt-up concrete walls are widely used to give the appearance of stone masonry.

• Sometimes river rock smooth oval-shaped stones is used as a veneer.

• This type of material is not favored for solid masonry as it requires a great amount of mortar and can lack intrinsic structural strength.

• Manufactured-stone, or cultured stone, veneers are popular alternatives to natural stones.

• Attractive natural stone has become more expensive in many areas and in some areas is practically unavailable.

• Manufactured-stone veneers are typically made from concrete.

• Natural stones from quarries around the world are sampled and recreated using molds, aggregate, and color fast pigments.

• To the casual observer there may be no visual difference between veneers of natural and manufactured stone.

Masonry repair work done to a brick wall

Gabions

Gabions are rectangular wire baskets, usually of zinc-protected steel (galvanized steel) that are filled with fractured stone of medium size. These will act as a single unit and are stacked with setbacks to form a revetment or retaining wall. They have the advantage of being both well drained and flexible, and so resistant to flood, water flow from above, frost damage, and soil flow.

Their expected useful life is only as long as the wire they are composed of and if used in severe climates (such as shore-side in a salt water environment) must be made of appropriate corrosion-resistant wire.

Bagged concrete

A low grade concrete may be placed in woven plastic sacks similar to that used for sandbags and then emplaced. The sacks are then watered and the emplacement then becomes a series of artificial stones that conform to one another and to adjacent soil and structures. This conformation makes them resistant to displacement. The sack becomes non functional and eventually disintegrates. This type of masonry is frequently used to protect the entrances and exits of water conduits where a road passes over a stream or dry wash. It is also used to protect stream banks from erosion, especially where a road passes close by.

Masonry training

Stone masonry is one of the oldest professions in the history of construction. As such it is regarded as a traditional skill, and is one which is in heavy demand.

Prospective stone masons will learn the profession through apprenticeships or a traineeship that will last 3 to 4 years. There are City & Guilds stone masonry courses available that combine college based theory training with practical learning.

6. Дайте ответы на вопросы.

1. What building materials are described in the text?
2. What components are they made of?
3. Where are these building materials used?
4. Would you like to use these materials in the process of construction?

Текст №7

1. Прочитайте текст и ознакомьтесь с его содержанием.
2. Выпишите интернациональную лексику и переведите с помощью словаря.
3. Напишите аннотацию текста на русском языке.
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5. Подготовьте устное сообщение на английском языке, используя материалы текста.

Metal

Sheet metal aircraft construction is the most prevalent aircraft construction material by all measures, used extensively from jet liners to light, single engine airplanes and kits over the past five decades. Furthermore, virtually all other aircraft types use sheet-metal construction to some degree – whether an instrument panel on a composite aircraft, or a firewall on a wood or steel tube and fabric design.

Common sheet-metal construction is most accurately described as "aluminum-alloy, semi-monocoque, stressed skin construction." This means that the metal used is some form of aluminum-based alloy, and that the airframe sections are designed and built so that the outer skin itself is part of the structure, with internal ribs, longerons, and bulkheads to distribute the loads. The metal parts are permanently joined with rivets or other fasteners.

Background:

Sheet-metal aircraft construction became a popular replacement to steel-tube (or wood) airframes covered by fabric because of its numerous advantages. Metal construction is more efficient because it does not need both a framework for structural strength (often accompanied by exterior braces) and a separate covering skin to provide the aerodynamic shape of the aircraft. Furthermore, sheet-metal is not as delicate as fabric, and not subject to ongoing damage by moisture and sunlight (UV rays). Aluminum-alloy construction is stronger yet lighter, while being very durable. By designing structural members to carry the required loads and to resist stress in relation to the physical characteristics of the metal parts and fasteners, a metal aircraft provides superior strength and durability while lowering weight (thus increasing performance).

New and modern metal alloys and materials have allowed aviation technology to advance, and is the reason it continues to dominate over other aircraft building methods. Aluminum’s unique combination of properties makes it one of the most versatile engineering and building materials in existence:

- Low weight / high strength relationship;
- Corrosion resistance, especially with newer alloys and modern primers;
- Low cost and widespread availability;
- Proven durability and resistance to sun and moisture;
- Existence of vast amounts of empirical data on its properties;
- Easy to work with: requires simple tools and processes, and does not require a temperature-controlled or dust-free environment, as with composites. Modern blind rivet fasteners have greatly simplified all-metal kit aircraft construction;
- Malleability: easy to form into many shapes, with almost no limit to the shapes it can be formed into;

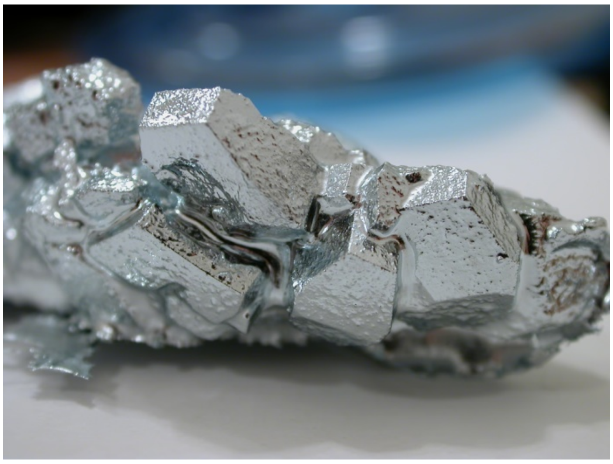
- Environmentally friendly: no health hazards to worry about when working with sheet metal; recyclable;
- Easy to inspect: construction or materials flaws are easily detected, as are defective parts and damage;
- Simple to repair: rivets and fasteners can be easily removed to replace damaged parts or sections, and individual parts can be replaced without having to replace or rework an entire airframe section.

Additionally, a well-designed sheet-metal aircraft provides superior crashworthiness over other types, as an impact's energy is absorbed by progressively collapsing the metal structure, as opposed to splintering or shattering upon impact. Another important advantage often overlooked is the inherent lightning protection that a metal airframe offers.

Sheet-Metal Construction Made Easy

As with most things, there are simple ways and then there are complicated and difficult ways of accomplishing the same goal. This is especially evident in aircraft design and construction: Making an aircraft easy to build starts at the design stage: A designer must not only be an expert in aerodynamics and stress analysis, but he (or she) must also maintain the builder's perspective when designing an aircraft. Unfortunately, this is not the case with many engineers today: Often a design may be aerodynamically and structurally sound, but it will be so complex to put together that it requires a skilled and tooled factory environment to put together, making the aircraft unduly expensive to buy, time consuming to build, and costly to maintain. Other times the opposite may be true, where an aircraft may be quick and easy to build, but at the expense of aerodynamic efficiency and/or structural integrity.

It's easy for an engineer to design a complicated aircraft, and more challenging to design a simple one. For a kit aircraft to be successful, it must be relatively simple in terms of construction, assembly and systems: Not only is a simple design easier and more affordable to build, but chances are that it will be well-constructed by the amateur builder, as there will be less opportunity for errors or poor workmanship. With a simple design, building time will be lower and less tools and skills will be needed to put the aircraft together, equating to much higher completion rates than complex projects.



Gallium crystals

Simplicity of Parts: While aluminum alloys may be formed into nearly any shape imaginable, this usually requires specialized skills and costly tooling. Cost is greatly reduced by using off-the-shelf stock aviation-grade materials (flat sheet metal and rolled extrusions), and simple shapes and bends simplify manufacturing and assembly. For these reasons, the surface skins on the aircraft are designed with single-curvature bends, as opposed to compound curves. Wherever possible, the internal structure is also made of straight, single-curvature parts, such as longerons, wing spars, and stiffeners. Internal ribs and bulkheads must be formed, and are stamped and hand formed using simple forming dies. Constant chord wing sections minimize the number of different formed parts and simplify assembly. The use of stock materials and simple parts make Heintz designs suitable for "scratch-built" projects, where the complete aircraft can be plans-built from the drawing (blue prints) and assembly instructions alone, saving the builder the cost of a factory-produced kit (though this requires some extra tools and time).

Heintz' designs are easily recognized by their thick wing sections, common on many older designs like the DC-3. A thick, cantilever wing provides maximum strength at minimum weight, while also being aerodynamically efficient since there is no drag-inducing exterior bracing. The wing's main structural member is a thick single spar, made up of a sheet-metal web riveted to top and bottom extruded longerons. Thanks to the high strength of this spar, a relatively low number of wing ribs and stiffeners is needed, thus simplifying construction. The efficient use of parts in a design limits the number of parts required to reduce building time and cost.

In Zenith Aircraft's kits, all the parts and materials needed to complete the airframe are supplied in the standard kit. The philosophy behind the kit is to supply all the parts and components in such a state that a builder needs only basic skills and tools to put the aircraft together. That means that parts are supplied pre-formed and ready for assembly, and that specialized components, such as welded steel parts, wing spar assemblies, ribs and bulkheads are provided in a completed, ready-to-install state. Recent improvements to the kits, such as pre-drilled flat skins, further simplify assembly while minimizing required skills.

Easy to Build: For the amateur builder, sheet-metal construction offers distinct advantages: The modular construction of an all-metal aircraft lends itself well to the homebuilder. Unlike a welded steel frame or composite shell that takes up a lot of space right from the beginning, a metal aircraft is made up of smaller sections that are only joined together later, minimizing workshop space requirements. Using single-curvature or flat sections reduces the need for any jigs or assembly fixtures, allowing the builder to easily build-up sections on a flat workbench (saving the time and expense of making jigs). With a Zenith kit, a builder measures, lines-up, drills and rivets the various components individually on the workbench, and only later are the assemblies joined together.

"Clecoes" are temporary fasteners (hole clamps) that firmly hold the drilled sections together before rivets permanently fasten them. With Clecoes, whole sections of an aircraft can be temporarily assembled and joined, and then easily disassembled before final assembly and finishing.

When putting together an all-metal aircraft, any assembly mistakes can often be fixed without having to replace a costly part. Building errors can be easily fixed simply be re-aligning and drilling the part correctly. Importantly, errors in sheet-metal construction are easily identified, unlike a poor weld or lamination that may go by undetected. The "open" construction of a sheet-metal aircraft makes it easy to put together and is readily accessible to install controls and other components. Installing an antenna or landing light on a metal aircraft is very straightforward - even after a section has been completed (whereas the same task on a composite structure may prove very time consuming, if not impossible, after a section has been closed).

To prove how quick and easy Zenith kits are to build, company staff has led volunteers in building and flying various Heintz designs within just seven days. In 1993, a ZODIAC kit was assembled and flown during the one-week EAA Sun'n Fun fly-in in Lakeland, Florida. Most builders of Zenith kits are novices with no prior aircraft building experience. To help them learn more about the construction and kit assembly, the company holds workshops at the factory to let potential builders gain hands-on building experience before making the commitment of starting a kit project.

The Completed All-Metal Aircraft

Aircraft ownership is a long term investment. The completed all-metal aircraft provides proven durability, and lower maintenance costs than fabric-covered or composite aircraft. Once an all-metal aircraft is completed and flying, the inherent advantages of aluminum alloys continue to be apparent:

1. Suitable for Outdoor Storage. The durability of a metal airframe makes it suitable for continuous outdoor storage, saving the owner ongoing costly hangar fees or the hassles of folding/removing the wings and trailering the aircraft home.

2. Easy to Inspect. Both external and internal structures can easily be inspected once a metal airframe has been completed. This becomes an important safety factor as potential problems may be identified before they manifest themselves. Since the workmanship and condition can be thoroughly inspected even on an older aircraft, the resale value of an all-metal aircraft is often optimized.

3. Easy Maintenance. The durability of an all-metal aircraft lowers ongoing maintenance requirements, and since most builders perform their own maintenance, this is accomplished with minimum down-time, cost, and complexity for the non-mechanic.

Despite the apparent successes of other construction types in kit aircraft, aluminum alloy's unique combination of versatile building and engineering properties is the reason all-metal construction continues to dominate as a prime building method of choice in all aircraft for many years to come.

The Roadmap to a resource efficient Europe1 , published in September 2011 by the European Commission stresses the need to turn waste into resource. Construction and Demolition Waste (CDW) contributes to one third of the waste generated in EU. Considering the huge Building stock in Europe, the construction sector will continue to produce significant quantity of waste from construction, renovation and demolition sites. Turning CDW, including renovation waste, into resource is then particularly relevant for Europe. Metals are already systematically reused or recycled from demolition or renovation sites.

When a building reaches the end of its life, a considerable proportion of its metallic products can be directly re-used, as currently happens with metal-framed buildings. Being flexible and adaptable, the functional life of these parts can be extended. However, a robust life-cycle assessment should be carried out to avoid that the re-use option is promoted while in fact leading to more impact at the use phase. For example, most windows designed 30 years ago do not meet today's minimum performance requirements and can therefore only seldom be reused. When a metallic building product reaches the end of its life, it can be fully recycled. Already, today, more than 95% of the metallic products used in buildings are collected at end-of-life2. Small and medium-sized companies play a key role in the collecting and processing of metal-containing products, on their journey to metal-recycling installations. High economic value is the main driver for this systematic collection and recycling.

As metal recycling provides energy savings of between 60% and 95% compared to primary production, depending on the metal and the metal-bearing product, metal recycling creates a win-win situation for both the environment and the economy. The reuse or recycling of metallic building products definitely saves resources. Recycling non-metallic materials from CDW makes also sense. The environmental benefits resulting from the recycling of CDW have been recently put into light within a Portuguese study3 done on large scale CDW recycling plant.

The study shows that the energy and CO_2 savings can reach up to 8 times the burdens of the recycling operations provided the generated secondary materials are effectively reused or recycled into new products where they clearly substitute primary materials. The study shows that the environmental savings largely depends on the type and quality of secondary materials produced from the deconstruction, demolition and sorting operations. Hence, maximizing the environmental benefits resulting from end-of-life operations definitely requires adapted practices and processes leading to “clean” secondary materials or products which are effectively and efficiently integrated into the material supply chain of products, i.e. replacing and then saving primary materials. Standards for measuring environmental benefits of CDW recycling and recovery are already existing European standards have been developed within CEN/TC350 “building sustainability”.

These standards4 define rules to develop the environmental product declaration for building products and to assess the environmental performances of buildings all along their life cycle. In particular, the benefits resulting from the end of life stage is addressed through a separate module (i.e. the so called module D) where the primary resources saving through reuse, recycling and energy recovery are reported. Maximizing resource efficiency at the end of life stage requests then to look not only at the burdens of the deconstruction and demolition operations but also at the positive effects of using back the secondary materials into applications where they substitute efficiently raw materials.

As demonstrated in a technical document developed by the French association of producers of construction products (AIMCC) 5 , this approach is the best methodology to demonstrate that end of life operations are effectively turning waste into valuable resources. This methodology is applicable not only to metals but also to any building material or product which is effectively recovered or recycled at the end of life stage. In addition, this approach allows integrating the “design for recycling” or “design for deconstruction” concept into the product development strategy and the corresponding Environmental product declaration. EU waste policies should promote end of life treatments which are resource efficient. As already done for many decades for metal products, several other sectors are now also paving the way for implementing recycling routes for their product or material especially if appropriate deconstruction strategies can be implemented on-site.

As example, the gypsum sector has initiated a European project to test a de-construction and recycling concept for plaster board 6. The glass sector also sees deconstruction as a pre-requisite for recycling end of life glass from buildings back into flat glass applications 7. A partnership is currently put in place to implement such strategy in France 8. While closing the material loop definitely saves primary resources, moving to this circular economy concept in the building sector without down-cycling requests for those non-metallic materials important efforts and investments in term of deconstruction practices, collection and recycling processes.

Hence, economic, logistic and legislative burdens are still obstacles to their implementation. From a legislative perspective, it is then essential to develop a waste policy promoting the implementation of these recycling schemes in the building sector as it is already implemented for metal products. Hence, for recycling market which are not yet mature or implemented, economic incentives should also be developed for triggering the integration of secondary materials into the supply chain of products. Considering that collecting robust figures and information from member state is a key step towards such a goal, the metal industry sees also a need to develop a guidance document at EU level in order to secure that the same terminology and harmonised metrics can be implemented to monitor effectively the level of completion of the various MS towards the defined targets. Such guidance can also be used for sharing the best identified practices implemented within Member States.

6. Дайте ответы на вопросы.

1. What building materials are described in the text?
2. What components are they made of?
3. Where are these building materials used?
4. Would you like to use these materials in the process of construction?

Текст №8

1. Прочитайте текст и ознакомьтесь с его содержанием.
2. Выпишите интернациональную лексику и переведите с помощью словаря.
3. Напишите аннотацию текста на русском языке.
4. Составьте реферат текста на русском языке.
5. Подготовьте устное сообщение на английском языке, используя материалы текста.

Glass

Glazing the largest business centre in Europe The Arlington group, which specialises in real estate office development, has built the largest business centre constructed to date in Europe on behalf of the world leader in business centres, Regus. Located to the east of Paris in the new Val d'Europe international business park, Regus invested in four separate office blocks in 2003, with a total office floor space of 7,500m^2. Since the façades are largely glass, high-performance solar protection glazing had to be chosen. In order to benefit from the verdant surroundings, glazing with light characteristics that would give the occupants as much natural light as possible inside the buildings, was sought. The solar control glass Pilkington Suncool™ Brilliant 66/33 was used to allow optimum energy management, whilst reducing the intensity of the impact of the sun on the buildings. In order to comply with safety requirements, especially in the glazed spandrels, Pilkington Suncool™ Brilliant 66/33 was assembled in insulating glass units (IGUs) with an inner pane of Pilkington Optilam™ 8.8 mm, laminated safety glass.

Apart from aesthetic criteria, economic factors were crucial in the construction of all these buildings. The use of this specific glass on the façade provides solar protection and thermal insulation, allowing climate control costs to be reduced whilst satisfying the architectural requirements of the designer. The Pilkington Suncool™ range of solar control glass fits in perfectly with current architectural trends, which favour transparency and the neutral aspect of glazed façades. The use of Pilkington Suncool™ will ensure a comfortable working environment for the occupants throughout the year.

A new development in one of India's fastest growing cities Cosmo City is a new office building in one of the fastest growing cities in India, Gurgaon. Built for leasing out commercial space to business establishments, this project occupies 13,935m^2, Cosmo City has been built in Gurgaon, a suburb of India's capital Delhi, by one of India's leading builders, Uppal. Cosmo City is Pilkington's biggest project in North India. As the city is growing at a fast pace, construction is booming and many corporate and commercial establishments are springing up. Glass challenge met by Pilkington Eclipse Advantage™. A major requirement for this building was to combine good light transmission, low solar heat transmission and low reflectivity to ensure reduced glare from other buildings as well as reducing glare from Cosmo City onto other buildings. Approximately 7,430 m^2 of glass was used for the external structural glazing. The glass used for this building was 6mm Pilkington Eclipse Advantage™ Arctic Blue T (toughened). Pilkington Eclipse Advantage™ Arctic Blue was selected for its excellent light transmission properties, along with the benefit of thermal insulation provided as a result of its low U value. Research has shown that as natural light increases, the working efficiency of the building occupants is boosted. Bearing this in mind, the architect wanted a glass that was not highly reflective but still had a low solar energy transmission, along with good light transmission. The colour was chosen as an aesthetic requirement of both the architect and the final client. Pilkington Eclipse Advantage™ Arctic Blue has an external reflectance of only 11% and at the same time provides low solar heat transmission. Both the architect and the final client were impressed with the glass and by the fact that it combines low E with a reflective solar control coating in one glass. As a toughened glass, it also ensures a safe environment for the occupants.

New style for an old industrial area. The project involved modernising the new Fratelli Giacomel Audi-Volkswagen Dealership in the redevelopment of an old industrial area in Assago, Milan. The overall glass surface area of the dealership is approximately 75,000 m^2. The design theme was elaborate, in order to comply with the client's requirements. These included:

● Creating a striking architectural-technological impact while focusing on the building's functional purposes;

● Physically separating the Audi and Volkswagen buildings from each other (which have their own distinctive corporate design image).

This was achieved by inserting a central block deliberately designed to be the striking image of a dynamically evolving company at the technological cutting-edge. Advanced technology and façades Thermal break, semi-structural aluminium façades were designed using unitised curtain wall systems. The glass featured insulating glass units (IGUs) comprising 8mm Pilkington Suncool™ Brilliant 50/25 T (toughened), 15mm air and Pilkington Optilam™ safety laminated glass with different thicknesses. The steel structure is fitted with four die-cast bearing columns and horizontal reticular roof beams. Large glass areas of Pilkington Optitherm™ SN low emissivity glass on low-iron Pilkington Optiwhite™ were used in different kinds of IGU compositions. The semi-structural skylights consisted of wide rectangular bays of IGUs comprising Pilkington Suncool™ Brilliant T 50/25 (toughened) and Pilkington Optilam™ safety laminated glass at different thicknesses.

Spectacular and visually harmonious glass façade. The MSV Arena is a high-tech football stadium equipped for multi-functional use. Principally intended as the venue for MSV Duisburg's home matches, the stadium takes its architectural inspiration from Germany's many newly-built stadiums. It can hold around 31,000 spectators, but the Arena is more than just a football stadium. Thanks to its multi-functional design, the venue can also host concerts and other social events. The open, glazed design creates a well-lit and bright foyer providing a spacious meeting place for visitors. The building adjacent to the west stand houses hospitality suites, catering facilities, restaurants, a business area, merchandise shops and MSV offices.

Modern glass design element Glass plays an important role as a modern design element. The main entrance to the west stand has an eye-catching glass façade, 120m wide and 11m high, comprising Pilkington Activ Suncool™ HP* Neutral 53/40. This glass was selected due to its dual beneficial role. The solar control properties ensure maximum light transmission whilst providing essential protection from solar transmission. Incorporating Pilkington Activ™ self-cleaning glass will result in savings incurred from glass façade cleaning costs. The lifts linking the four levels of the main building allow an unobstructed view down into the lobby below. The open-plan design of the floors also makes it possible to look from the ground floor right up to the third floor. Access to the players' changing rooms is located opposite the entrance. A glass wall in this area makes it possible to watch the players coming out of the changing rooms on their way to the pitch. The architects have thus achieved their objective of creating an open, visible atmosphere where players appear to 'mingle' with fans.

High-tech

The functional architecture is typified by elegance and airiness, which at the same time meets spectators' needs perfectly. The main entrance to the west stand, with its glass and aluminium façade, is eye-catching. The glazing includes complex functional glass technology, combining sun and noise protection with thermal insulation and self-cleaning properties.

Transparency and natural light. The glass façade fulfils a variety of functions. From an aesthetic point of view, the glass provides transparency and natural light. Functionally, it provides solar, acoustic and heat insulation, whilst having an additional self-cleaning property. Self-cleaning Pilkington Activ™ was selected for this application to keep costs for future façade cleaning as low as possible. The result, in combination with the insulating glass units, is a spectacular and visually harmonious glass façade.

A showcase of glass and steel. The Ezeiza International Airport in Buenos Aires has recently undergone an extension which has remodelled the terminal building. The new building is an amazing showcase of steel and glass, covering 60,000 m^2 of floor space located adjacent to the old terminal. Pilkington glass meets the challenge. The building's architectural image is to a large extent defined by the attractive green tint of its façades, glazed with high performance insulating glass units of Pilkington Eclipse Advantage™ EverGreen glass and Pilkington Energy Advantage. The striking combination of glass and metal successfully achieved provides wonderful luminosity and excellent thermal properties. The key factor in achieving this was the use of Pilkington Eclipse Advantage™ EverGreen, which helped to increase the natural light into the building and at the same time reduced the intensity of solar heat radiation into the building. Insulating glass units with good acoustic properties were also necessary to attenuate the ambient noise. The use of Pilkington Optilam™ Phon with a special polvinlyl butyrl (PVB) 0.76 interlayer, with noise reduction elements achieved this. The building design aims to improve movements and effortlessly emphasises the direction passengers are required to follow. Architectural ideas have focused on the continuous activity in the terminal, and therefore provide a pleasant environment for employees and travellers.

Security with a lighter touch Hovfaret 4 is a new commercial building in Oslo, constructed and owned by EDB Fellesdata Company. The main features of the building are glass façades and a partially glazed roof. While a neutral glass was specified to allow as much light into the structure as possible, the most important requirement was security. The building will house the computer control centre for most of the Automated Teller Machines (ATMs) in Norway, and so security is paramount. The solution that was finally chosen was a combination of solar control glass and safety glass. Description of construction. Various systems have been used for the façades, windows and doors of the building. Royal S65 was chosen for the windows and doors. This is an insulated system made from 65 mm aluminium. Conclusion with this project, the architect has tried to create an exciting building with character, the central feature being the rounded glass shape of the 'towers'. The widespread use of glass has also contributed to the overall atmosphere of the building. The glass façades and glass roof provide extensive amounts of light, giving an interior feel of vast open spaces. The benefits for the users are that this building offers a great sense of security in addition to a light and spacious office environment. The solar control element of the glass will keep the climatic condition of the building balanced.

A new face for a 20th century listed building

In an eleven-month building operation, the outer façade of the ageing Musiktheater in Gelsenkirchen has undergone a total renovation. The passage of time had certainly left its mark on the steel/glass façade of this impressive building, which was built in 1959 under the direction of architect Werner Ruhnau. As a listed building, no structural changes were allowed.

Architectural integrity. Each new component had to be tailored exactly to the existing dimensions, thereby ensuring the integrity of the original architectural concept. Renowned for its fusion of architecture and art, the theatre is numbered among the most exceptional buildings of German post-war architecture. Inspired by Bauhaus – and Mies van der Rohe in particular – the concept behind the architecture was to integrate the theatre into urban space, a goal successfully achieved through the huge steel and glass south façade. Guests perceive the theatre as an extension of the urban landscape. Through the glass façade, the piazza seems to extend into the spacious foyer. The building becomes a showcase, through which guests can be seen and indeed will wish to be seen. With signs of corrosion on the steel façade, tarnished windows that no longer closed, low insulation single pane windows and fire protection materials containing asbestos, the case supporting a total renovation had become overwhelming. The immediate task was quickly defined: thermally separated aluminium frames were to be developed for the ageing steel façade, using state-of-the-art technology in a form that would accommodate the existing contours of the façade.

A large number of special aluminium frames was developed. This involved taking into account the various styles of cladding that characterised the theatre. A 15m-high upright cross-frame member construction measuring 2.80m by 2.70m was developed for the glass on the south façade. The side walls were installed with elements consisting of pivotal opening windows with fire-resistant panels and enamel panels on the parapet area. Glass – optically and technically first-rate. The decision was taken to use modern solar protective glazing with exceptional energy efficiency, particularly on the south façade, given the fact that due to the building's listed status, no structural modifications such as exterior shadings could be made. An additional requirement was that the glass should not change the character of the building and should be almost neutral in appearance and transparency. Following the development of a full-size sample, the decision was made to use Pilkington Suncool™ Brilliant 66/33. While its light transmittance of 66% provided a large quantity of light in the foyer, the low total solar heat transmittance of 36% (both values in accordance with EN 410) ensured a pleasant climatic environment. The toning is equally exceptional and is hardly distinguishable from normal glass. The parapet areas of the lateral façades were furnished with façade panels on white glass – matching the original white tone. In combination with the renovated white enamel panels, the façade has been successfully upgraded to the latest technical standard, while still maintaining its original appearance.

Wall of Glass. In the evening, the magnificent 'wall of glass' also opens up the south façade to the neighbouring piazza. The Musiktheater is eye-catching and attracts many passers by. The rejuvenated Musiktheater im Revier combines architecture and art, and now the art of glass.

An inspiration in glass and wood Striking design Metla House is the largest wooden office building in Finland and the biggest forest research centre in Europe. The building has three storeys and is designed to accommodate 225 people. It consists of offices, laboratories and communal spaces such as a lobby bar. Metla staff moved into the new building at the end of October 2004. Glass & wood in fusion. The goal was to produce an inspiring working environment by using Finnish wood together with glass in an innovative way. Wood is naturally the main material in the building, from the post-beam slab system in the structural frame to the exterior cladding. The courtyard entrance is flanked by walls made of 100-year old timber and the walls have also been protected against climatic conditions by 'terva' pine tar which is a traditional and natural wood preservative in Finland. One of the reasons for choosing Pilkington Suncool™ Brilliant 66/33 and Pilkington Optitherm™ SN was for the excellent transparency & low reflectivity that both products offer which was an architectural requirement for the façades. This resulted in providing natural light to the atrium as well as creating an open spatial environment to the inside of the building without the façade visually separating the outer and inner sections of the building. The lunch canteen is located on the ground floor with a glass façade of Pilkington Suncool™ Brilliant 66/33. Due to the solar control glass used the temperature in the canteen remains pleasant during summer months. The excellent transparency of the glass is noticeable during evening hours when internal lighting makes the wooden pillars inside the building clearly visible resulting in a fascinating view.

Overturned boat design. The Metla meeting room, a shingled roofed conference room in the inner court of the house resembles an overturned boat split partly on the outside and partly on the inside of the building by a glass façade. The tilted wooden columns can be seen through the glass façade especially when illuminated. The idea for the tilted wooden columns was derived from fish chests used for catching lampreys. Subsequently, the wooden construction featuring a glass façade to increase light transmittance has been promoted through various governmental programmes in Finland and several wooden constructions have already been built. One of the best known is the Sibelius Hall in Lahti – a concert and congress centre situated on the site of the old Lahti Glass Factory.

Pilkington Cool™ Lite offers the solution to an exciting architectural challenge of the recent commercial buildings that have been constructed around the new Brigadeiro Faria Lima Avenue, in São Paulo, Birmann 31 has the most innovative design. "A jewel made of silver glass emerging from a rough stone", is how the architect describes the building, the design of which was based on a jewel. The building occupies 15 storeys. The client's request was to produce a building that combined the elements of glass and stone in a different way to other surrounding buildings, whilst maintaining a comfortable working environment for the building's occupants. 8,000 m2 of Pilkington Cool™ Lite laminated glass was used, to provide the excellent transparency and low reflectance that was required to meet the perfection essential for the prism-shaped façade. Pilkington Cool™ Lite provided the solution towards extreme solar glare that could be experienced in a high rise building. At the same time the glass façade fulfilled the requirement for maximum natural light transmission. The cool tint of the glass also resulted in a pleasing aesthetic hue. The rough stone on the façade is strengthened on the base, which is narrow and becomes broader as the building becomes higher. This gradual change helps to exaggerate the height of the building, making it appear taller.

Windows in the choir of the Basilica of Saint Denis, one of the earliest uses of extensive areas of glass. (early 13th-century architecture with restored glass of the 19th-century)

Above the stone grates, the large multi-faced glass façade highlights the local skyline. The entire city skyline is visible from the upper two storeys of the building. The multi-faced façade was intentionally built by the architect to be north facing as a pre-emption of the reflective interaction the building will have with other such buildings being constructed in the area. The ground level of Birmann 31 is occupied partially by a bank agency, whose hall covers all corners. On the other side, an L-shaped room brings the multi-faced glass theme to the inside, exploiting it in a more colourful way through the wall's coatings. With wooden laths on the roof and granite floor, the area is a pleasant surprise to those entering the building. Pilkington Cool™ Lite is a product of a Pilkington joint venture with Saint Gobain in Brazil. It is available in North and South America.

Traditional art and culture meet modern glazing. The town of Ridderkerk, in the west of the Netherlands, is currently experiencing a surge in commercial and residential building construction. Shops, houses, offices, a Multifunctional Centre and an extension to the old Town Hall have been erected within a short time frame. The old Town Hall consists of five floors and is connected by a glass footbridge on the third floor to the new extension. Multifunctional Centre. The Multifunctional Centre consists of public social areas such as the Grand Café, the ballroom and a meeting place on the ground floor. In addition, the School of Music has occupied various floors to provide teaching classrooms and administration offices. Windows. Early in the project the engineering consultancy firm Arcadis contacted Pilkington requesting glass products that could be utilised to regulate the temperature of the different functional areas. The main requirement was to achieve a pleasant interior temperature, with a high level of solar control but without loss of daylight. Solar product combinations meet various challenges. Various insulating glass unit product combinations consisting of Pilkington Suncool™ Brilliant 50/25 have been used to meet other challenging objectives. Pilkington Suncool™ Brilliant 50/25 combined with Pilkington Optilam™ met the objective of providing the occupants with not only excellent natural light through the building and protection from excessive solar rays but a safe environment as well. In combination with Pilkington Optilam™ Phon the building benefits from reduced external noise into the building due to noise reduction polyvinyl butyrl (PVB) interlayer in the glass. Pilkington Pyrodur™ provides outstanding fire & safety protection by restricting the spread of flames, smoke and hot gases. It achieves up to 60 minutes integrity, together with partial heat insulation. It is suitable for both internal and external applications.

Decorated façade. The glass façade of the Town Hall council chamber, the wedding room and court room are decorated with art motifs based on the etchings of Italian architect, engraver and designer Giovanni Battista Piranesi (1720-1778). The engravings give the Town Hall a romantic character. The glass façade is approximately $420m^2$. An image of a classic temple has been sandblasted into the glazing of the Grand Café and the folding partitions in the central hall to recreate a design created by Piranesi just before his death. The Ridderkerk arms, which is a motif depicting St George and the dragon has been sandblasted with green paint onto the façade above the main entrance which faces the city square. This motif was created by French artist Jean-Pierre Pincemin (1944-2005). The windows on the ground floor are decorated with an abstract art motif by Pincemin, again sandblasted onto the glass. This has resulted in a ‘curtain’ effect providing the obscurity required to guarantee a degree of privacy. The Ridderkerk Town Hall and Multifunctional Centre is a project in which old art and culture meet modern glazing demands in perfect harmony. The result is an artistic masterpiece in glass, providing a comfortable and safe environment through the choice of a range of high performance glass products.

Maximising light and minimising noise in an urban environment. The building The construction of the Novum Private Clinic on Bociania Street in Warsaw, Poland proves that spectacular architecture need not necessarily be associated with a prestigious location. Novum is located in the unfashionable Ursynów area of Warsaw. Not only is it located on the busy traffic-laden Pulawska Street, but the flightpath of the nearby Warsaw Airport adds to noise levels. As a unique and unusual glazing project, Novum presented a challenge from concept to completion. The clinic is divided into three main sections: a semi-circular reception area, surgery rooms and a laboratory towards the rear. The ground floor is covered by sandstone and concrete pillars run from the ground floor up to the roof. The expansive roof is painted with copper designs, which relate to earlier historic periods, as found in Szara Willa (Grey Villa) next to Warsaw University Library.

Products meeting needs. The main priority was to provide a pleasant environment to ensure the well-being of the patients. The requirement for large amounts of daylight to penetrate the building was to be balanced by the need to reduce solar transmission into the building during summer periods. These objectives were met by glazing the entire first level floor corridors and staircases with a gable skylight. Highly processed Pilkington Suncool™ Brilliant 66/33 was the glass of choice. This product has a high selectivity factor, providing high light transmittance and low solar energy transmittance. High performance. Insulating glass units (IGUs) with good acoustic properties were necessary to attenuate the noise of heavy traffic from the street as well as that produced by aircraft movements in and out of Warsaw Airport. High performance Pilkington Insulight™ Sun IGUs consisting of 8 mm Pilkington Suncool™ Brilliant T 66/33 on the outer pane and Pilkington Optilam™ 8.8mm on the inner pane were used for the skylight. Visually, Pilkington Suncool™ Brilliant 66/33 glass, with its low light reflectance factor and slight greenish tint, ideally complements the sandstone and concrete aspects as well as the copper painted roof. The Novum Clinic is another example of ingenious architecture that does not follow modern design and stylistic trends, but demonstrates the vast application and features of glass craftsmanship.

6. Дайте ответы на вопросы.

1. What building materials are described in the text?
2. What components are they made of?
3. Where are these building materials used?
4. Would you like to use these materials in the process of construction?

Текст №9

1. Прочитайте текст и ознакомьтесь с его содержанием.
2. Выпишите интернациональную лексику и переведите с помощью словаря.
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Plastics

Materials With Muscle

The building and construction industry is the nation's second largest consumer of plastics. Only packaging creates more demand for plastic materials today. In the construction of all types of buildings – for pipes, valves and fittings, heavy-duty uses and decorative touches, inside and outside – plastics are building a reputation for durability, aesthetics, easy handling and high performance.

Hard at Work

In building construction, plastics abound in plumbing fixtures, siding, flooring, insulation, panels, doors, windows, glazing, bathroom units, gratings, railings and a growing list of both structural and interior or decorative uses.

For pipes, valves and fittings, plastics offer superior corrosion resistance and are lighter, easier to install, and more cost effective than their alternatives. Impervious to chemicals and sulfur-bearing compounds, plastic piping safely transports everything from fresh water to salt water, and from crude oil to laboratory waste.

These qualities also have combined with plastics' high strength-to-weight ratio to produce materials for bridge construction, including tough reinforcement rods, nonskid surfacing and quickly installed replacement decking.

For commercial buildings that contain sensitive electronic equipment, plastics can provide highly protective housing that does not interfere with radio frequency or magnetic waves.

From the home to the workplace - and maybe even on a bridge in between - plastics are on the job.

Making Themselves at Home

Changing demographics and the high cost of housing have created new Images of home for many Americans. These new Images, in turn, have created new trends, and these new trends have created new and additional uses of plastics in residential construction.

Many households today consist of single working people, small families and couples without children – people who often don't need or can't afford a large home. As a result, the current trend is toward smaller, less costly multifamily dwellings, such as townhouses and condominiums. While many of these buyers and renters are willing to do without the greater square footage of a traditional single-family home, they still expect comfort and convenience. This means better use of space, clever combining of rooms and features and reliance on plastics to give design flexibility at reduced costs. From the functionality of built-in shelving to the luxury of cultured marble surfaces, plastics can provide the materials.

Added Attractions

Trend forecasters also predict that families who do purchase single-family homes increasingly will opt for existing older homes, which they will refurbish to suit their needs. Here, too, plastics will play a major role, with replacement and improvement materials offering both functional and decorative benefits.

As families grow, homes age and tastes change, remodeling will be initiated. As this happens, contractors and do-it-yourselfers increasingly will turn to light, strong, easily handled plastics to make improvements and repairs, from ceiling tiles to advanced wiring and from modern bathroom fixtures to improved installation.

In building additions as well as new construction, plastic materials will continue to add speed, save energy and reduce costs. With plastics, for example, bathroom fixtures such as tubs, showers and sinks can be constructed in one piece – walls, pipes and all – and then hoisted into place and attached to the building frame, producing significant savings in construction and installation costs.

In restoration of older homes, plastics can provide the best of both worlds: the duplication of yesterday's beauty using today's superior materials. Architectural touches such as decorative wall, door and window moldings can be achieved that mimic marble or hand carvings but offer the ease of care and damage resistance only plastics can provide.

Plastics are expected to proliferate in all homes – large and small, new and renewed – for easily installed ceiling materials with excellent acoustic, thermal and fire-resistance qualities, lower-cost window frames that stand tough against the elements but need little maintenance and durable entry doors that offer superior insulation and unique beauty. From foundations to roofing and virtually everywhere in between, plastics increasingly will answer the call for building materials that hold up and stand out.

Plastic

In the year 2000, probably 8.3 million tons of plastics will be used in the construction and renovation of buildings in Western Europe

Of all the applications of plastics, building and construction is the second most important area, with a volume of 23 %, only coming second to packaging applications. Some 8.3 million tonnes of plastics will be used for construction applications in Western Europe in the year 2000. The average working life of all plastics applications in construction is 35 years but, depending on the specific application, this has a wide variation between 5 years (such as wallpaper) and 80 years (such as pipes). These are only cautious assumptions, because there is not yet any practical long-term experience with a technically defined end to their working life.

The oldest plastic products, manufactured on a large scale and used in the building industry (such as pipes), have been in use for 55 years and are still functioning as well as on the very first day. With an assumed average working life of 35 years, there is technical depreciation of 2.85 % per year. Plastics in the construction industry are thus extremely economical with resources. Environmental balance sheets consider not only economical use of resources, but also the cost of maintenance during the life of the applications. Since most plastics are either easy to maintain or require no maintenance at all, they also achieve first-class marks in their life-cycle evaluation.

Compared with alternative materials in the building industry, plastics usually do better in environmental assessments. In addition to saving resources, the low maintenance cost throughout their life cycle and good recyclability of many plastics used in construction have a positive influence on these assessments.

In particular, the materials used in monoplastic building products such as pipes and window frames are recycled at the end of their working life and the recycled product is used in high-quality pipes and window frames as specified in the relevant standards and norms.

In addition to the ecological advantages of plastics, they also make a great contribution to the saving of energy. Plastic foams are used widely for thermal insulation of house walls, floors, roofing, pipes and many other applications. Without such plastic thermal insulation, the high targets adopted by the world community for $CO2$ reduction would not be realised.

Plastic insulation systems can also make a significant contribution to noise protection and noise insulation, thus again adding to the quality of life.

After pipes and insulation, the third major application area is for wallcovering and flooring. Flooring, in particular those made of PVC, have been in use for 55 years, and have proved their worth in domestic areas such as kitchens, bathrooms, corridors and children's rooms. They have also made a very valuable contribution in public areas, such as hospitals, sick-rooms, operating theatres, schools, municipal buildings, offices and sports centres.

The fourth-largest application area is window frames, which are made almost exclusively out of PVC. This is an application that has developed relatively recently (since only 1965) but, over 35 years, it has secured more than a 50 % share of window systems in the major industrialised countries of Europe.

Although the life-cycle calculation for window frames indicates an average life of 40 years, the actual technical end of their working life has not yet been reached and, to date, very few used window frames have yet been returned. The capacity for recycling window frames has therefore not yet been exploited, due to a shortage of waste, but technologies have been developed for incorporating a portion of recyclate in new profiles.

Profiles for interior fittings (which have been in existence since 1955) have also secured an important role, accounting for 8 % of the total plastics consumption in the construction industry. They are used in doors, flooring trim, skirting boards, conduits, and guide rails, covering and decoration.

Externally, extruded rigid profiles play a useful role as shuttering, cladding and siding and fencing.

With the exception of insulation and board applications, PVC is by far the most-used plastic in all application areas in building and construction.

In the total wealth creation chain for PVC building products, there are about 11,000 firms operating in Western Europe, employing 275,000 people. The turnover of this secor of the industry amounts to an estimated Euro 36.5 billion a year. Many plastics are used where their specific properties can be profitably employed. Depending on the type of material employed, these may include: good hygiene, easy maintenance, heat resistance, thermal and acoustic insulation.

They also offer glass-like transparency, abrasion resistance, resistance to sunlight, waterproofing, resistance to low temperatures and resistance to acids, chemicals and washing and cleaning agents. These are just a few of the outstanding properties that various plastics can offer in specific applications.

The Building Products market

In the year 2000, probably 8.3 million tonnes of plastics will be used in the construction and renovation of buildings in Western Europe. If these products were made out of traditional building materials, their weight would probably be as much as ten times higher.

There are also significant savings in cost and energy when it comes to transporting plastic construction materials and plastics promote free movement of building materials in the European Union as well as the global market, whereas some traditional materials cannot be exported due to their high weight and enormous transport costs. So today, it is possible for plastic products to be used in any country. They can be manufactured anywhere – even in small markets, because their low weight makes plastic construction products exportable.

Above-average growth is expected for plastics in construction applications in the next ten years also, largely supported by substitution of traditional building materials. In the year 2000 a growth of 3.4 % is expected while PVC will increase its share by about 2.5 %. Other plastics will show an above-average growth rate of about 7.5 %.

Recycling considerations

The building and construction sector is, of course, fundamentally concerned with long-lasting products and materials, which may well be in place for 40 years before they require replacement. There is therefore little experience of practical recycling of plastics building products on a large scale – and, apart from dumping as landfill, there is no experience of recycling any other building material.

When the time comes, however, the great amount of technical work on recycling plastics building products to reuse the material will certainly prove an advantage. Many systems have been developed for re-using waste plastics as a central core of panels and large-diameter pipes – with good properties and economics. Plastics come in the form of thermoplastics or thermosets. As thermoplastics (which is the larger part of plastics building products), they can be shaped and re-shaped by the application of heat. The same basic facility can still be utilised for the reuse of recyclates from used products, to manufacture new products.

There may be some loss in original properties, from prolonged exposure to sunlight and particularly from re-processing, but all the work so far shows that this can be modified by the use of suitable additives, to "boost" properties back to their original values.

Thermosets are plastics that undergo a chemical change when they are first processed. This gives them their great hardness and strength, but it means that they cannot be re-shaped thermally afterwards. For recycling, however, they can be ground and reused as a filler. Economics again come into play when considering recycling, and the low original cost of the vast majority of plastics used in building makes it very difficult for re-processed material to be offered at a competitive price unless, possibly, within "closed-loop" systems as already described. A significant development, however, is the increasing use of more expensive technical plastics in high-tech building systems which, in time, could provide the building sector with specialized plastics products with a potential.

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Текст №10

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2. Выпишите интернациональную лексику и переведите с помощью словаря.
3. Напишите аннотацию текста на русском языке.
4. Составьте реферат текста на русском языке.
5. Подготовьте устное сообщение на английском языке, используя материалы текста.

Construction paints

The demand for construction paints and coatings is mainly prompted by growing infrastructure activities globally and the growing demand for water borne paints and coatings. Asia Pacific dominates the global market for construction paints and coatings. This report by Transparency Market Research analyses, estimates and forecasts the construction paints and coatings demand on a global and regional level for a six year period from 2013 to 2019, both in terms of volume and revenue. The study also provides information on restraints, drivers and opportunities along with the impact on the overall market for the forecast period. The report segments the market based on application and region and offers estimates and forecast of the construction paints and coatings market for each segment.

The study analyses the product value chain beginning with feed stock material up to end-use. In addition it also evaluates the market based on Porter's five forces model that analyses the degree of competition in the market by considering factors such as the bargaining power of buyer sand suppliers, threat from substitute product sand new entrants. The report includes a detailed competitive landscape of the construction paints and coatings market including company market share analysis and the profile of key market participants.

Painters commonly use brushes and rollers to apply paint

Inflation is not a part of pricing in this report. Prices of construction paints and coatings vary in each region. Given that different end users use different types of products, pricing for each application varies according to region while estimating and forecasting market revenue on a global basis. Regional average price has been considered while breaking down this market by end application in each region. The market size of the global construction paints and coatings market has been presented in terms of both volume as well as revenue. Market volumes are given in kilo tons and market revenue is in USD million. The market numbers are given on the basis of product type and application in the context of the global as well as regional market. Market size and forecast for each major application is also provided in the context of the global as well as regional market. The numbers provided in this report are derived on the basis of demand for construction paints and coatings from various end user industries in different regions. The numbers provided in this report have been derived on the basis of demand for construction paints and coatings from various end user industries in different regions. All the prices have been considered as FOB prices. All market revenue has been calculated on the basis of sales and consumption trends.

The report provides a decisive view on the construction paints and coatings market by segmenting the market based on product types and applications. Product segments analyzed in this report include High solids/radiation cured, Powder coatings, water-borne coatings, solvent borne coatings and others (specialty coatings). Based on applications, construction paints and coatings are segmented into architectural paints and others (special purpose coatings, etc.). All application segments have been analyzed based on present and future trends and the market is estimated from 2013 to 2019.

The construction paints and coatings market is segmented based on geography into North America, Europe, Asia Pacific, Latin America and Rest of the World. The demand of each application type of construction paints and coatings in terms of both revenue and consumption for each of these regions is forecasted in this report for the period 2013 to 2019.

New Construction Painting Techniques

Although there are many techniques for painting the inside and outside of a new building, some painting techniques meet the needs of most painting projects. The goal is to match the right painting techniques to the structure for maximum weather protection and a lasting finish.

Wood Exteriors: Choose Oil or Acrylic

For a wood exterior, the most important question concerns the choice of paint. Painting with acrylic paint on a wood exterior represents a better choice for the exterior of a building because the paint will "expand and contract with changes in wood," according to the Painting Information Network. Oil paint is also available, but it requires more solvent and damage occurs to the wood faster, because the oil paint become brittle with age. An oil paint job on a wood exterior costs the building owner more money over time due to the need to repaint sooner. Another common effect of using oil paint for wood exteriors is the need to replace the wood surface itself sooner due to moisture damage. A standard technique for applying oil and acrylic on wood is using a roller mounted on an extension.

Wood Exteriors: Backpriming

After selecting the paint for a wood exterior, there is another consideration for preventing water damage. Tim Carter, a nationally syndicated newspaper columnist, notes that backpriming is the step that many construction professionals skip on a new building. "Backpriming involves the process of coating all surfaces of a piece of wood with paint or any other coating which will inhibit water or water vapor from soaking into the wood," but it has to be done before the wood is installed. Paint a new building with a wood exterior using a primer coat and at least two layers of exterior paint for a lasting finish.

Concrete Paint: Apply Coating or Primer

The concrete exterior of a new construction project requires several steps before the exterior paint is applied with the traditional back-rolling technique. The following process is based on consumer information provided by Behr Paints: Clean a new concrete exterior thoroughly using a series of steps such as edging the concrete, removing any dirt or stains sustained during construction, cleaning the surface with concrete cleaner and rinsing the surface with water before the cleaner dries. When the concrete has dried, apply a concrete coating or a concrete/masonry primer before applying the final color. Whether using latex or acrylic exterior paint, the traditional technique of back-rolling is recommended by Behr, which involves rolling back into where you had just painted.

6. Дайте ответы на вопросы.

1. What building materials are described in the text?
2. What components are they made of?
3. Where are these building materials used?
4. Would you like to use these materials in the process of construction?

Часть III. ТЕКСТЫ ДЛЯ ВНЕАУДИТОРНОГО ЧТЕНИЯ

Текст №11

1. Прочитайте и переведите текст.

Classification of stones

Basalt is black, heavy or homogeneous. The true basalt is an Augitic stone, named after the mineral Augite or Pyroxene, of which, with Labradorite Felspar (a silicate of alumina and lime), it is composed. Augite having magnesia for its base, and being of a dark or black colour.

Granites comprise all stones of independent crystals of differing materials, which are so intimately connected as to form a homogeneous whole, and include most of the felspathic and hornblendic stones. All true granites contain felspar and quartz, and the ordinary typical granite consists of felspar, quartz, and mica, while many contain hornblende also. Felspar varies in colour, being sometimes white, sometimes grey, sometimes pink, and sometimes a deep rich red, and the colour of the granite, of which it forms a large part, varies accordingly.

The quartz crystals also vary in tint, though they are frequently white. They are almost pure oxide of silicon, otherwise known as silica; and it is found that they contain minute cells partly filled with water. The grains of felspar and mica are partly embedded in the quartz grains, and hence it is concluded that the quartz was the last to solidify. The mica occurs as small flakes of dark colour, which flash as they catch the light. It is a source of weakness, as it is liable to decay.

Hornblende is a silicate of magnesia and lime, with iron and manganese. It is a very tough mineral, of a dark green or black colour, and frequently occurs in granites in small distinct crystals.

Granites which contain hornblende in place of or in addition to mica, are called Hornblendic or Syenitic granites.

Under the term granite are commonly included other igneous rocks, little used for building purposes, such as the Porphyries, Elvan and Gneiss, which is constituted like granite, but has the mica more in layers, along which it splits easily, coming out in slabs from a few inches to a foot in thickness.

There are several methods of constructing dry **stone** walls

Slates are composed of clay (silicate of alumina). The chemical elements of all clay, shales and slates are aluminium, silicon and oxygen, and the origin of all alike is to be found in the natural production of Kaolin, a pure white clay, by the decomposition of the felspar of felspathic rocks such as granites. This is washed into streams and rivers and so is conveyed to the sea, where, consisting of matter in an extremely fine state of division, it is carried further from the shore than the other ingredients of the original granite, and so is deposited separately, forming a clay bed. This forms material for newer clays, and so on; while clay beds which have long been subjected to vertical pressure have been compacted into shales and mudstones, and when these again are subjected to great lateral pressure and high temperatures they have been changed into the hard and strong material known as slate. Owing to the extremely high temperature at which the change takes place, slate, like all other metamorphic and igneous rocks, contains no organic remains. It is practically non-absorbent, and as it can be split into exceedingly thin parallel layers of considerable size, it is a most valuable roofing material.

Many other stones, both sandstones and limestones, which naturally occur in thin enough layers to be used for roofing purposes, are locally known as "slates", "slate-stones", or "tile-stones".

Colyweston "slates", though used as roof coverings, are really limestone of a dark grey colour. The stone is obtained in the form of a block, or slate log, showing no sign of lamination. They are more absorbent than true slates, and require strong roof timbers to carry them, while they foster lichen growth; but their colour is pleasing, and some architects use them to a considerable extent.

Marbles are composed of pure carbonate of lime in a highly crystalline form, resembling lump sugar in structure. The white marble has been metamorphosed from pure white limestones, while the coloured marbles derive their colour from impurities, mostly oxide of iron, in the original limestones from which they have been changed, the colour having run into beautiful veins and markings during metamorphosis. Almost all colours are represented, and all combinations of colour. Like granite and slate it is also an excellent weathering stone, and can be obtained in large blocks. The combination in the same stone of strength, size of block and beauty of colour and texture, renders marble one of the most valuable of building materials. Though heavy and capable of carrying heavy loads, it is soft and easy to work.

Alabasters are commonly and wrongly classed among the marbles. The true Oriental Alabaster is a beautiful translucent and nearly white limestone, often now erroneously called onyx marble, whose circular markings indicate its stalagmitic origin. It is difficult to obtain, and is replaced in general use by the softer sulphate of lime, also known as alabaster, the two being superficially similar. Alabaster should only be employed internally and for ornamental purposes.

Limestone is composed mainly of carbonate of lime, as are of so open a texture as to prevent their taking a polish. Even so, a wide range is covered, and many sub-divisions are possible.

Oolitic stone is easy and inexpensive to quarry and work, and is therefore known as a “freestone”, while it possesses uniformity of colour (generally a light cream or brown), comes to a good surface, and weathers satisfactorily. Of sedimentary origin, it lies in beds, often of considerable thickness, though the “bedding” is still visible in the blocks. Sometimes this is shown by the position of fossil shells, which always lie flat on the beds, and sometimes by markings which, if of clay, are sources of weakness. Other markings, however, frequently traverse the beds, and are due to the vertical percolation of water through fissures. Frequently the effect has been for the water to convey carbonate of lime to a fissure, which from being a source of weakness has become a source of strength on being filled with a crystalline substance; and in other cases a similar result has been achieved by percolation of silica, though silica veinings of this sort render a stone comparatively hard to work. They are more useful for street pavings than for building purposes, though they look well as “shoddies” rough ashlar facing blocks with freestone dressings, on account of the contrast of colour, the lias stones being generally of a dull and somewhat deep blue. While magnesian limestones vary greatly in composition, the true dolomite is of a peculiar granular and crystalline structure. As a rule a dolomite is fine of grain, and uniform in colour and texture, moderately easy to work, and an excellent weathering stone.

Sandstones include all stones whose grains are composed of silica. This mineral, the most abundant in Nature, assumes various forms, in some of which it is known as rock crystal, flint, chalcedony, agate, and amethyst, and constitutes not only the sands of the sea shore and the desert and the pebbles of shingle beaches, but the framework of many tropical sponges. The sand of which sandstones are composed has been derived either from quartzose igneous rocks such as granite, from the quartz veins of the older sedimentary rocks, from flints and from the destruction of older sandstones and beds of sand. The grains consequently vary much both in size and angularity, some sandstones being composed of grains both larger and angular, while others have very small and rounded grains, worn down to their present condition by long-continued rubbing by the action of moving water.

2. Ответьте на вопросы.

1. What building material is this text about?
2. Is it widely used all over the world?
3. What can you say about the classification of stones?
4. What is basalt composed?
5. What do granites comprise?
6. What can you say about the properties of slates?
7. True marbles are composed of practically pure carbonate of lime in a highly crystalline form, aren’t they?
8. What is onyx marble?
9. The sandstones are the most abundant in Nature, aren’t they?

Текст №12

1. Прочитайте и переведите текст.

Stone

To all stone users the selection of the most suitable stone is a matter of supreme importance. There is scarcely a stone produced that is not frequently specified to be used in a position for which it is entirely unsuited, while the same stone might in another position, and for another purpose, be the best which could be utilised.

Colour is a point upon which actual inspection is infinitely more valuable than description, as in all colours the various shades are innumerable. Even samples often fail here for many stones vary in tint not only between different beds of the same quarry, but even in different parts of the same block.

Ornamental markings, as in the veined and the fossiliferous stones, stand in this respect upon the same footing as colour. In other cases the markings are quite different according to the plane along which the stone is cut, some stones being exceedingly beautiful along some planes and quite dull and lifeless along others; while the fossiliferous stones often show circular markings if the fossils are cut directly across and irregular or rectangular markings if they are cut longitudinally.

Texture depends not only on the size of the grains of which a stone is built up, but on their character and the homogeneity of the mass. Most of the very hard stones, like the granites, marbles, and compact limestones, can be brought to a smooth surface, and in that condition be left plain or be highly polished, the latter being the more usual and displaying to perfection their marking and colouring. Granite, however, may be left with a roughly chiselled or even a hammer dressed surface, when its coarse and angular grain gives an effect of great solidity and strength. A somewhat similar effect can be conveyed by the use of the coarser sandstones, but it is missing with the coarse limestones, which suggest crumbling weakness if left rough, through the roundness of the oolite grains or the fragmentary stratification of the shells which they contain. Hard smooth limestones like the lias, look strong when hammer dressed, exposing smooth chipped faces separated by sharp arrises; while smooth rubbed surfaces can be produced on the fine-grained sandstones and limestones alike.

Hardness is one of the qualities in a stone which most considerably affects its cost in use. Thus where economy is a principal object for consideration, the softest stone which will serve the purpose should be used. Elaborate carving can be indulged in, where it is protected from the weather and from wear, without great expenditure if a very soft stone be used; while it would very likely cost three times as much if executed in a sufficiently hard stone to withstand exposure to weather or friction.

Wear in many positions demands something more than mere hardness to withstand it successfully. When used as stairs, landings, or pavements, many of the more compact stones become slippery, while others, like the lias limestones, wear into holes. An angular grit prevents slipperiness, and this is possessed as a rule by granite and the coarser sandstones. Those sandstones which occur naturally in slabs in thickness with true surfaces, are much used for these purposes.

Strength in stone is not often a matter requiring great consideration, as under ordinary circumstances any stone is capable of bearing the slight load brought upon it; but where, as in vault groining, church pillars, columns, and girder bearings, great thrusts and loads are brought to bear upon small surfaces, strength becomes of supreme importance.

Correct bedding is, in the case of most of the laminated stones an absolute necessity. In ordinary walling, bearing a vertical load only, the beds should lie horizontally. Were horizontal bedding attempted with undercut mouldings, the undercut portion would flake off and so edge moulding is resorted to, with the bedding parallel to the vertical joints. Face-bedding, as it is called when the bedding lies vertically and parallel to the face of the wall, should never be used, as the surface tends to peel off. In the case of stones resisting heavy thrusts, the bedding must be at right angles to the thrust, as it is in this position that all stone is strongest to resist. A skilled mason can generally detect the bedding of a stone at sight, by noting that fossils lie flat on the bed, or by small bed markings; or if these fail he can "feel" the bed when he works the surface with his chisel.

The *size* of slab and depth of bed obtainable are important factors in determining the selection of stones for many purposes, where large sizes are needed. Many excellent stones are obtainable only in comparatively thin beds.

The *durability* of a stone used externally seems to be a matter which can properly be determined by experience only. Where subject to the action of water and of marine insects, as in sea walls, weight and hardness are essential to durability, but in general building work this is not the case, many stones of comparatively light weight and open structure being known to be excellent weathering stones. Water may penetrate into the pores of some stones, freeze, expand, and blow off fragments; but this is an infrequent occurrence, except with the very softest. Similarly limestones should not be able to resist the action of the acids contained in the air of all large towns.

Absorption is not an entirely reliable test of durability, and certainly not as between class and class of stone. Walls built of absorbent stones are liable to be damp walls, especially if the stones be compact of structure as well as absorbent, and so of a nature which prevents their parting readily in fine weather with the water they have absorbed during rain. Such a stone will probably be found to contain minute fissures along which water will be absorbed to a considerable depth by capillary attraction. A wall built of such stone will be more permanently damp than one composed of stones of more open grain, which absorb even a larger proportionate weight of water; for water penetrates further and is retained longer in fine cavities than in larger ones.

Several means of *preserving* the less durable stones have from time to time been suggested, painting either with lead paint or with oil being the most common, and requiring periodic renewal.

Of *destructive agencies*, water is the most to be feared, either from its proverbial "wearing" action, which is mechanical, and whose effect is seen in sea walls and on the “weather” side of buildings in exposed situations, or from its action as a solvent carrying destructive acids present in the air of large towns into the body of the stone, or from its expanding just previously to freezing after having been absorbed, and so splitting off small fragments of stone. Lichens, mosses, ferns, and creepers are also highly destructive, especially to limestones, both through the penetration of roots into the pores of the stone, and through the vegetation holding water like a sponge, and so giving time for any acid the water may contain to act. Water is thus again the actively destructive agent. Lodgment for it should never be provided, and such things as hollow mouldings, water-holding carving, and soffits unprotected by drips should be studiously avoided in external stonework. Stone is a weight-carrier, with little transverse and less tensile strength. Use it, therefore, freely in compression, with caution as lintels, and never in tension. Bring pressure upon it at right angles to its natural bed, or, in the case of slate, to its cleavage. Arrange that each stone may be cut with as little waste as possible out of a roughly rectangular block, such as is obtained from the quarry. Mouldings and carvings cannot be planted on. The effect must be obtained by sinking the hollows below the natural surface. Avoid elaborate and undercut detail in the harder and in the laminated stones. Avoid sharp arrises in the more friable stones, and where exposed to rubbing or weather.

2. Ответьте на вопросы.

1. The selection of the most suitable stone for the immediate purpose of the moment is a matter of supreme importance to all stone users, isn't it?
2. Does stone texture depend on the character and the homogeneity of the mass?
3. What can you say about such stone quality as hardness?
4. How do you understand the word combination *correct bedding*?
5. What is the most destructive for stone body?

Текст №13

1. Прочитайте и переведите текст.

Bazalt and granite

Basalt, being hard and difficult to work, and mostly found in places from which transport is difficult, is little used structurally; and the method of quarrying is elementary. Owing to its columnar structure, it comes out of the quarry in long prisms. These, if placed on their sides and bedded in cement, make an excellent facing for sea-walls, where weight and indestructibility are primary considerations. A decorative dark green Basalt which comes out in large beds, splits readily, and polishes well. Used structurally, it makes good hammer dressed walling, especially for plinths and basements.

Granite, generally considered as igneous and intrusive, is thought by many to be of sedimentary origin. It is a holo-crystalline aggregation of quartz, felspar and mica, its chemical composition varying with its mineral contents; and no less than 44 accessory minerals occur in it in varying proportions. Orthoclose, or potash felspar, is generally its principal constituent; its colour varies from white to flesh-red, and its grains are irregular and sharply defined. It is usually thought to be a weather stone of undoubted quality; but this is not by any means always the case. Some granites are no better weather stones than the softer oolites, crumbling in the hand after a few years' exposure, and the opinion of a mason accustomed to granite working should be sought where doubt exists. If exposed to fire it disintegrates badly.

Gneiss is a rock which has the same mineral constituents as granite, but is more or less stratified. It is very little used in building. Granite is extensively worked, generally in large, open quarries. The beds as a rule are very thick; but still, horizontal beds do occur at intervals, and these often contain a very thin layer of sulphur. If vertical joints of the same nature are found, the great natural blocks can be wedged apart. Otherwise, and more frequently, it is necessary to blast. Vertical holes are driven downwards, close against the new quarry-face which it is desired to expose, the quarry being worked in rough steps. These holes are made with a "jumper", which is a tool like a long bar of iron, weighted at about 1/3 of its length from the point with an attached ball of iron, and having a chisel edge. This the workman merely lifts, turns slightly, and drops, so that drilling a blasting hole is a slow process. After the circular hole has been made to the required depth, a notch is cut throughout its whole length in each direction in which it is desired for the rock to split. The number and position of these holes vary according to the block required, the charge, generally blast gunpowder, is proportioned so as to split the rock where required and lift it forward without unnecessarily breaking it up, and all the charges are exploded simultaneously. In many quarries, if the blocks have not been thrown over the old quarry-face by blasting, they are now levered to the edge till they fall over, and are removed from its foot by cranes and trucks, or by a more elementary system of wood rollers; while in other quarries it is necessary to use large cranes and lift the blocks to the top for transport. Rough irregularities are always knocked off with a heavy hammer, or the stone is split up into smaller blocks or slabs by making a series of holes, less in depth, larger in size, and closer together than the blast holes, and driving peculiar wedges into these. Two "feathers" are first inserted, these being of steel and resembling shoe-horns in shape, and then a steel "plug", in the shape of a truncated cone, is driven in between the feathers. The several plugs in a series have to be tapped in succession to ensure even driving and an uniform split. Sawing, such as will be afterwards described when dealing with marble, is sometimes resorted to for producing slabs, but it is a tedious operation; and the same may be said of turning. After splitting roughly to size with the plug and feathers, the next process is that of reducing surface irregularities with the scabbling hammer and has a short handle. The flat, or "spalling", face is for knocking off irregular lumps and angles, or for roughly "hammer-dressing" the surface, while the pointed or "pick" face is applied vertically to the surface, being just lifted and allowed to drop of its own weight, this action being repeated rapidly by a skilled workman and soon reducing a rough to a comparatively smooth surface, chips flying off in all directions. If the scabbier has two pick faces, and is known as a scabbling pick, it is somewhat lighter in weight, finer work being possible with it, while finer work still can be done with a pick having toothed edges, known as a serrated pick, or with an axe. It is this tool which is generally used to produce the so-called "draughted margins", with their parallel tool marks close together, though the same effect can be produced more tediously by means of a chisel. The finest face, short of polishing, is obtained on Granite by the patent axe, which consists of a bundle of steel plates bound together, so that they can be taken apart and their edges sharpened when necessary. Heavy machinery is necessary for polishing economically on a large scale. The fine axed surface has to be ground down by rubbing on a revolving or travelling table in sand, the weight of the granite, which lies on the table, applying sufficient pressure. This rubbing is repeated, with material of finer and finer grain, until the surface becomes of that absolute smoothness known as high polish, the granite, during these later processes, being fixed, and movement being imparted to the rubbers. Granite is used largely in building operations wherever stone is required to carry a heavy load or resist constant friction, as in plinths, columns, and pavings, while much is also employed for merely decorative effect. The waste blocks and chippings are commonly utilised also, the larger as road metal, and the smaller as the aggregate for concrete and artificial stone, so that the ultimate proportion of waste from a granite quarry is small effect.

2. Ответьте на вопросы.

1. What building materials is this text about?
2. Is basalt hard and difficult to work?
3. Why does basalt come out of the quarry in long prisms?
4. What can you say about the method of its quarrying?
5. Where is basalt used?
6. What does granite consist of ?
7. What does the colour of granite vary from?
8. What is gneiss?
9. What countries is granite imported from?

Текст № 14

1. Прочитайте и переведите текст.
2. Составьте 10 вопросов к тексту и дайте на них ответы на английском языке.

New Construction Materials for Modern Projects

***S.A. Reddi**, Deputy Managing Director (Retd), Gammon India Ltd.*
India is witnessing construction of very interesting projects in all sectors of Infrastructure. High rise structures, under construction, include residential/commercial blocks up to a height of 320 m and RC chimneys for thermal power stations extending upwards up to 275 m. Majority of the

structures are in structural concrete. The functional demands of such high rise structures include the use of durable materials. High Strength Concrete, Self–compacting Concrete are gaining widespread acceptance. Apart from the basic structural materials, modern projects require a variety of secondary materials for a variety of purposes such as construction chemicals, waterproofing materials, durability aids etc. The paper highlights some of the recent developments.

Durable Concrete

Concrete Design and Construction Practices today are strength driven. Concrete grades up to M80 are now being used for highrise buildings in India. However, due to escalation in the repair and replacement costs, more attention is now being paid to durability issues. There are compelling reasons why the concrete construction practice during the next decades should be driven by durability in addition to strength. A large number of flyovers and some elevated roads extending up to 20km in length are being realized in different parts of the country and involve huge outlay of public money. However, the concrete durability is suspect. Many of the structures built during the period from 1970 have suffered premature deterioration. Concrete bridge decks built during the period now require extensive repairs and renovations, costing more than the original cost of the project. Multi-storied buildings in urban areas require major repairs every 20 years, involving guniting, shotcreting etc.

A holistic view needs to be taken about concrete durability. In this context, there are a large number of materials in the market which facilitate durable construction. Apart from the materials, the construction processes have also undergone changes with a view to improving the durability of the finished structure.

High Performance Concrete

Figure 1 : SCC Column
(a) Reinforcement couplers (b) Smooth Surface of SCC

In the United States, in response to widespread cracking of concrete bridge decks, the construction process moved towards the use of High Performance Concrete (HPC) mixes. Four types of HPC were developed:

- Very High Early Strength Concrete – 17.5 mPa in 6 hours
- High Early Strength Concrete – 42.5 mPa in 24 hours
- A Very High Strength – 86 mPa in 28 days
- High Early Strength with Fiber Reinforcement
- High Performance Concrete was introduced in India initially for the reconstruction of the pre-stressed concrete dome of the Kaiga Atomic Power Project, followed for parts of the Reactors at Tarapur and Rajasthan. Subsequently, a number of bridges and flyovers have introduced HPC up to M75 grade in different parts of India.

Self–compacting Concrete (SCC)

SCC was developed by the Japanese initially as a Quality Assurance measure, but now is being widely used for concrete structures worldwide. In India, one of the earliest uses of SCC was for some components of structures at Kaiga Atomic Power Project. Many components of the structures were very heavily reinforced and the field engineers found it difficult to place and compact normal concrete without honeycombs and weaker concrete.

SCC was successfully used.SCC leaving the batching plant is in a semi-fluid state and is placed into the formwork without the use of vibrators. Due to its fluidity, SCC is able to find its way into the formwork and in between the reinforcement and gets self-compacted in the process. SCC is particularly useful for components of structures which are heavily reinforced. The fluidity is realized by modifying the normal mix components. In addition to cement, coarse and fine aggregates, water, special new generation polymer based admixtures are used to increase the fluidity of the concrete without increasing the water content.

Due to its high fluidity, the traditional method of measuring workability by slump does not work. The fluidity is such that any concrete fed to the slump cone falls flat on raising the slump cone; the diameter of the spread of concrete is measured as an indication of workability of SCC. This is called Slump Flow and is in the range of 600 – 800 mm. Apart from the use of superior grade chemical admixtures, the physical composition of the concrete for SCC has undergone changes. The concrete is required to have more of fine aggregates and compulsorily any of the mineral admixtures – fly ash, ground granulated blast furnace slag (GGBFS), silica fume, metakaolin, rice husk ash etc. Fly ash is abundantly available as a waste product at all the thermal power stations and the Government has encouraged use of fly ash by offering them practically free at the thermal power stations. GGBFS is again a by-product of the steel mills. During the production of steel, a molten steel is poured from blast furnaces and travels in special channels, leaving the impurities on top of the stream. The waste material, being lighter moves on top and easily diverted away from the usable steel.

The diverted slag is quenched and forms small nodules. These nodules are crushed and granulated into very fine product, with particle size smaller than that of cement. The product is marketed in 50 kg bags and available economically in the regions around steel mills with blast furnaces. In other regions, additional transport cost of this bulk material is involved but its use is justified because of contribution to durability of concrete. For the concrete components of the structure for Bandra and Worli sewage outfalls in Mumbai, the German prime contractor insisted on compulsory use of GGBFS for the M40 concrete in order to improve the durability of concrete. GGBFS had to be transported from Vizag in the eastern part of India, in spite of heavy transportation cost. Since then GGBFS is finding widespread use in different parts of India for ensuring durable concrete.

The Use of Mineral Admixtures

Figure 2 : Palais Royale–The Tallest Building in India under construction with M-80 Concrete Columns in Self–compacting Concrete

After realization of the need for durable concrete structures, the composition of concrete has undergone changes. From being a product made of three or four materials (cement, aggregates, water), today a typical durable concrete consists of six or more materials. The use of low water cement ratio enables a reduction in the volume and size of capillary voids in concrete; this alone is not sufficient to reduce the cement based content of concrete which is the source of micro-cracking from thermal shrinkage and drying shrinkage.To reduce the cement based content, both the water content and cement content must be reduced as much as possible. Concrete mixes with fewer micro cracks can be produced by blending the cement with mineral admixtures either in the batching plant or in the cement plant. This enhances the service life of concrete structures in a cost-effective manner.

Fly Ash

Thermal power stations are left with an undesirable by-product, fly ash, in large quantities which is not able to effectively utilize or dispose of. Currently, (2009) more than 120 million tons of fly ash are generated annually and the storage and disposal has been costing the power stations substantial unproductive expenditure. Unfortunately, all the fly ash available at the power stations is not fit for use as mineral admixture directly. Fly ash as a mineral admixture should conform to IS: 3812. Such a material is available in the finer streams of Electro Static Precipitators fitted to the power generation system.

The coarser materials are required to be processed (generally with the help of Cyclones) before being considered for use as mineral admixture for concrete. There are only a few processing units in India, including the one as Nashik Thermal Power Station. As per the Euro Code for Concrete, only processed fly ash can be permitted as mineral admixture in concrete. The code limits the use of fly ash. About 35% of cement may be replaced by fly ash; the actual percentage replacement depending on the outcome of trial mixes.

High Volume Fly Ash Concrete (HVFA)

The high volume fly ash concrete (HVFA) represents an emerging technology for highly durable and resource efficient concrete structures. Laboratory and field experience have shown that fly ash from modern coal-fired thermal power plants, when used in large volume (typically 50 – 60% by mass of the total cementitious materials content, is able to impart excellent workability in fresh concrete at a water content that is 15 – 20% less than without fly ash. To obtain adequate strength at early age, further reductions in the mixing water content can be achieved with better aggregate grading and use of super-plasticizers.

HVFA concrete has now been successfully used in a few sporadic projects in India. All SCC in India use HVFA, to the extent of 50% cement replacement. Some concrete roads being built by NHAI have also used HVFA concrete, including the Four-Laning of Satara – Kolhapur National Highway.

Ground Granulated Blast Furnace Slag (GGBFS)

The problems associated with the quality of fly ash do not exist in the case of Ground Granulated Blast Furnace Slag GGBFS, as the produce is necessarily the outcome of grinding to the required particle size. Thus the use of GGBFS as a mineral admixture should be preferred, despite long leads for end users in certain parts of India far from the steel plants. GGBFS sold in India is of uniform quality and particle size gradation. For many landmark structures such as the Burj Dubai (the tallest building in the world in 2009) GGBFS has been extensively used as a mineral admixture, even though the material is imported from other countries, resulting in the landed cost being more than that of cement. This was a conscious decision with a view to obtaining a more durable concrete structure.

In India the use of GGBFS has been fairly limited, in spite of all the technical advantages. The Indian Concrete Code permits up to 70% of cement replacement where GGBFS is used. Technically, the use of GGBFS is more effective only at replacement levels of 50% or more. For a number of structures in a port in Andhra Pradesh, typically the M40 concrete mix contained 100 kg of cement and 300 kg of GGBFS.

Portland Slag Cement (PSC) is also available and useful for ensuring durability of concrete structures. Due to the proximity to steel mills, PSC is generally produced in locations close to steel plants. Here again due to the bulky nature of the product, the transportation cost predominate. Another issue concerning quality of the PSC is the actual percentage replacement while making PSC; this information is not normally displayed on the bags, leaving the user at a disadvantage. In developed countries, information regarding the percentage of slag utilized in making PSC is generally printed on each bag of cement.

Condensed Silica Fume (CSF)

CSF is a by-product of Ferro-Silicon industry and at present an imported product, easily available in the Indian market. The particle size is very small, about 100 times smaller than that of cement. It can occupy the voids in between cement particles in a concrete mix, reduce the water demand and thus contribute to a very dense concrete of high durability. Normally, 5 – 10% of cement can be replaced by CSF in order to produce durable concrete. The product is expensive and is used in developed countries only for very high strength concrete (above 75 mPa). Indiscriminate use of CSF for lower grades, barring exceptions, only increases the project cost without corresponding technical benefits. Even when used, the percentage replacement should be based on trial mixes in each case, which may vary from one to 10%. CSF may also be used for High Performance Concrete of lower grades.

Ternary Blends

Ternary blends of mineral admixtures are now recommended for improving the durability of important concrete structures. An outstanding example is the Reconstruction of the New I-35 W St. Anthony Falls Bridge crossing the Mississippi River in Minneapolis, US. The new bridge has been opened to traffic in September 2008, less than 14 months after the collapse. HPC has been used for reconstruction with a target 100 year life span. High Performance Concrete containing silica fume and fly ash was used for low permeability.

Two gleaming white concrete sculptures tower 9 m high at each end of the bridge. The sculptures were precast using an SCC mix that included photo-catalytic cement with self cleaning and pollution reducing characteristics. The photo-catalytic cement is one of the new developments in the construction materials industry. The SCC concrete resulted in a marble-like, smooth white finish to the concrete surface. With a low water cementitious material ratio (w/cm), air entrainment and a rapid chloride permeability test (RCPT) value of less than 1500 coulombs at 28 days, the monument will also be a durable feature in the severe environment adjacent to the I-35 W Roadway.

For the drilled shaft foundations of the I-35 Bridge, SCC was used. To control temperature during curing, fly ash and slag were incorporated as the majority of the cementitious material. This reduced the heat of hydration by approximately 50%. The concrete mixes for the footings and piers were proportioned for mass concrete and durability through the use of fly ash and slag. As the components were massive in size, concrete mixes were modified by cementitious materials, chilled water and cooled aggregates, use of form insulation and internal cooling pipes.

Cement Silos

The use of batching plants for producing concrete is gaining increasing acceptance. As large volumes of cement are used in a batching plant, the cement is generally stored in vertical steel silos. When cement is received in bulkers from the factory, the same is directly pneumatically pumped into the silos which have capacities ranging from 50 to 500 tons depending upon the project requirements. If only bagged cement is available, they are emptied into the silos, usually with the help of screw conveyors. For modern applications, more than one silo will be required depending on the types of cement and mineral admixture used in the concrete mix.

In a recently commissioned batching plant complex in the Middle East, each of the two plants feature nine cement silos for Portland cement, slag cement, micro silica, fly ash and SRC cement.

Durability Enhancing Products

A full line of products are available to prevent or repair corrosion damage. A typical corrosion inhibiting admixture prevents deleterious expansion and cracking caused by the formation of rust during over-induced corrosion. There are also penetrating sealants to protect new and repaired concrete from the corrosive effects of chloride. The silane and siloxane based reacting sealers soak into the surface, creating a barrier against water or chlorides.

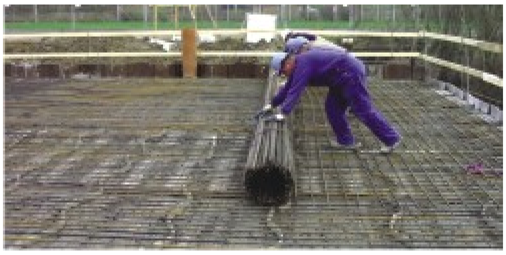
A number of concrete waterproofing admixtures eliminate the need for conventional external waterproofing membranes and saves time, money and hassle at the construction site. It transforms concrete into a water-resistant barrier by becoming an integral part of the concrete matrix.

Hydrophobic Concrete Waterproofing System

A typical patented product uses three materials to achieve a water-tight concrete structure, a super-plasticizer which reduces batching water requirements, thus limiting the volume of the capillary pour network in the concrete; a reactive hydrophobic pour blocking concrete admixture and product specific water stop protection at construction dams. Other accessory products include an operation retardant, curing compound, water stops and polypropylene fiber reinforcement. The patented product is typically added while concrete mix is being prepared to assist waterproofing. One product is applied at the rate of 5 liter per of concrete. Typically the manufacturer provides a warranty period of 10 years. The performance warranty provides for repairing water leakage through industry accepted and approved means for a period of 10 years. The product however has some negative impact on the rate of gain of strength of concrete. As a rough indication, the specified characteristic 28-day strength of concrete will not be achieved at 28 days but at 56 days or more.

The cementitious content of concrete using the integral waterproofing compound shall not be less than 325 k g / c u m with up to 50% fly ash or slag replacement. The water cement ratio shall be adjusted to compensate for the water in the waterproofing compound and super-plasticizer and maintain the required workability. The water cement ratio shall not exceed 0.42. The product is of American origin, represented by an Indian company which provides the necessary technical expertise.

Reinforcement



The revised BIS Code 1786 provides for four grades of reinforcement characterized by the yield strength – Fe 415, Fe 500, Fe 550 and Fe 600. Each of the first three grades is also available with superior ductile properties and a nomenclature is Fe 415D, Fe500D and Fe550D. Primarily the ductile grades specify a higher elongation value. Use of higher grades reduces the tonnage of steel in compression members e.g. columns substantially, results in decongested reinforcement and facilitates easy placement and vibration of concrete. Fe 415 and Fe 500 are easily available in the market. Fe 550 is now being offered by some prime producers – Tata Steel, Sail etc. After the revision of the Code, Fe 550 is also offered in selected diameters.

Fe 500 bars are now used for a number of highrise buildings, bridges and flyovers in India. Lapping of bars results in congestion of steel creates difficulties in proper placement and compaction of concrete and of course more expensive for large diameter bars. Couplers are now preferred instead of lapping. With widespread use, the cost of couplers has come down. The coupler design and manufacture permits the joints in the same plane without the need for staggering as in the case of lapping Fig. 1 shows typical use of couplers for columns of a multi-storied building in Mumbai.

Ternary Blended Cements

Ternary blended cements containing the combination of fly ash–slag, fly ash–silica fume or slag–silica fume are commonly used for concrete in many parts of the world. The European Standard EN 197 for cement lists 27 different combinations for cement. Usually mineral admixture used may present a complimentary effect on cement hydration. Limestone filler addition produces favorable effects on cement test. In particular, the physical effects caused by limestone filler enhance the strength due to hydration acceleration of Portland clinker gains at very early age and the improvement of particle packing of the cementitious system. However, the rate of hydration is initially lower than that corresponding to Portland cement; shows a reduction of strength at early age and similar or greater strength at later ages. Ternary cements containing a limited proportion of limestone filler (no more than 12%) and 20 – 30% GGBFS provide a good resistance to chloride ingress and good performance in sulphate environment of low C_3A Portland cement.

Photo-catalytic Cement

This is a patented Portland cement developed by Italcementi Group. The photo-catalytic components use the energy from ultra-violet rays to oxidize most organic and some inorganic compounds. Air pollutants that would normally result in discoloration of exposed surfaces are removed from the atmosphere by the components, and the residues are washed off by rain. This cement can be used to produce concrete and plaster products that save on maintenance cost while they ensure a cleaner environment.

In addition to Portland cement binders, the product contains photo-catalytic titanium dioxide particles. The cement is already being used for sound barriers, concrete paver blocks and façade elements. Other applications include precast and architectural planners, pavements, concrete masonry units, cement tiles etc.

Insulated Concrete Form (ICF)

ICF structural elements allow maximum clear spans. The ICF elements are used for large commercial buildings, residential buildings etc.

Exterior Self–leveling Concrete Topping

This is a Portland cement based product for fast track resurfacing and smoothing of concrete. It produces a smooth flat hard surface and dries quickly without shrinking, cracking or spalling. Pourable or pumpable when mixed with water, it installs 6 to 20 mm thick in one application and up to 50 mm thick with the addition of aggregate. It is pourable or pumpable when mixed with water. It can be used on, above or below grade and it makes spalled or damaged concrete look like new. Once sealed it creates an excellent wearing surface.

Carbon Dioxide (CO_2)

As part of a future global atmospheric stabilization strategy, industrialized countries may lead to use large amounts of carbon dioxide. CO_2 may be used for curing precast concrete units. Manufacturers of concrete masonry units could use CO_2 to reduce energy consumption. Steam curing which is conventionally used is energy intensive. Although CO_2 curing provides slower strength development than steam curing, the performance can be improved if the blocks are properly pre-conditioned before CO_2 curing. It has also been noted that the water absorption of CO_2 cured blocks is lower than that of steam cured blocks.

Corrosion Inhibiters for Reinforced Concrete

Calcium nitrate has been proven to inhibit reinforcement corrosion. About 3–4% calcium nitrate of cement by weight is sufficient to protect the reinforcement steel against corrosion. Typically a corrosion inhibiter should

a. raise the level of chlorides necessary to initiate corrosion or

b. decrease the rate of corrosion after it has started or

c. both. Since it does not necessarily prevent corrosion from happening altogether, it is more appropriate to call the product as corrosion retarders.

Coarse Aggregates for Concrete

The BIS Code (IS:383) permits the use of three types of coarse aggregates– natural gravel (shingle), crushed stone or a blend of both. Many outstanding structures built in India in the past had used river gravel as coarse aggregate for concrete including dams (Bhakra), prestressed concrete aqueducts and siphons (Kunu Siphon), large number of prestressed concrete bridges, power stations (Trombay 500 MW Unit V) etc. The results are excellent. Use of rounded aggregates, by virtue of their geometry, reduces the cement and water content requirements of concrete, thus contributing to the economy. Almost 50% of all the concrete produced in the developed world utilizes natural gravel and broken stone is used only when gravel is not available within economic leads.

Recycled Aggregates

With continuous development activity worldwide, the availability of coarse aggregates from natural sources or crushed rock are dwindling; at the same time, due to demolition of old structures, roads etc., a large amount of debris is generated annually and their disposal poses problems for the individuals and the Governments. In many countries including the UK, any demolition agency is not permitted to dispose of the debris except at predetermined locations which may involve very long leads, expensive operations. Extensive research has now established that the debris can be crushed, processed and recycled as coarse aggregate for fresh concrete. Such recycling solves the above mentioned problems of disposal, and also more economical. Many national codes in the developed world permit the use of recycled aggregates in concrete, subject to safeguards.

Lightweight Aggregates

These are manufactured products and are extensively used in all types of structures involving longer spans where the dead-load forms a major component of the loads involved in the design. Such lightweight aggregates are manufactured products using expanded clay, sintered fly ash etc. Their contribution to strength depends on the type and quality of the lightweight aggregate, the size fraction used and the amount of aggregate used as well as the type and quality of binder in concrete. However, the addition of lightweight aggregate in concrete reduces the modulus of elasticity.

High Performance Lightweight Concrete

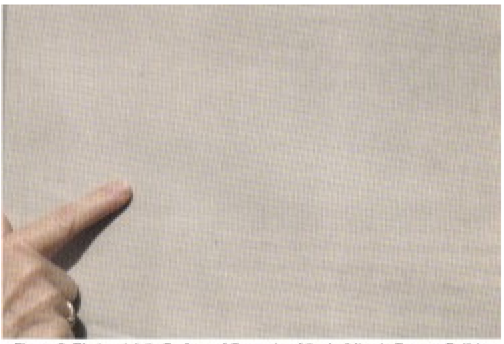


Figure 3: Photocatalytic Surface of Concrete of the building in France, Built in 2000

By using high strength/high performance lightweight concrete in prestressed concrete bridge girders, spans of bridge girders can be extended by up to 20%. The implications of using lightweight aggregate on prestressing losses long-term creep and shrinkage deformation should be considered. Compressive strength of up to 75 mPa has been obtained. They also result in reduction in creep and shrinkage and consequently lower prestressed losses. The overall costs for a given load capacity are reduced. The reduction in the structure dead-load leads to a reduction in the foundation size.

Self–curing, Shrinkage-free concrete

Italian researchers have produced a concrete by the combined use of

a. a water reducing admixture based on polycarboxylate in order to reduce both the mixing water and cement.

b. a shrinkage reducing admixture

c. an expansive agent based on a special calcium oxide.

The combined use of an expansive agent and a PC based water reducing super-plasticizer results in a shrinkage-free concrete even in the absence of any wet curing. Due to the water reduction caused by the PC based super-plasticizer at a given w/c, there is a reduction in the volume of cement paste and a corresponding increase in the amount of aggregates. Both are responsible for significant reduction in the drying shrinkage.

Advanced Composite Reinforcement

In highly corrosive environments, the use of advanced composite fiber reinforced polymers (FRP) is attractive as a replacement for conventional steel reinforcements. While the FRP materials can be resistant to corrosion, there is lack of ductility. At the moment FRP reinforcement in India is quite expensive. The main market for FRP in India is for structural retrofit for increasing the load capacity, to remedy construction defects or repair damages.

Application of Nano Technology

Reducing particle size of a material to nano–scale often imparts new properties or enhances existing ones. This is typical of nano particles of titanium dioxide, which maintains its photocatalytic activity even when mixed with cement. External cement based surfaces become strongly photocatalytic, leading to a much better appearance and a significant reduction in concentration of pollutants in the surrounding air.

The photoactive titanium dioxide was found to be a more powerful photocatalytic agent when its particle size decreased to non size. This makes it an ideal vehicle for application in construction. A cement binder containing about 5% of active titanium dioxide produces concrete with a smooth surface and also converts the pollutants, removes them from the surrounding air. In a typical application on a building in France completed in 2000, the quality of concrete surface have remained unchanged till date. The structure looked as if it were freshly built (Fig 3.)

Cleaner Surfaces and Less Pollution

Mixing active titanium dioxide with cement produces a binder that maintains its entire normal performance characteristic when used to make concrete. The photocatalytic action makes the surfaces not only to a significant self–cleaning; it also improves the quality of surrounding environment. Using titanium dioxide in glass fiber reinforced concrete offers more efficient and economical way to achieve the benefits of photocatalytics. The environmentally active e-GRC offers the most economical way to achieve cleaner, brighter facades.

Applications for the e-GRC include

- Cladding panels and facades elements
- Permanent formwork and form liners
- Roofing tiles
- Motorway and Railway sound barriers.

Текст № 15

1. Прочитайте и переведите текст.
2. Составьте 10 вопросов к тексту и дайте на них ответы на английском языке.

TFI Building Materials Files Bankruptcy Papers

September 13, 1991 JOHN O'DELL TIMES STAFF WRITER

SANTA ANA – In yet another sign that the building industry remains deep in recession, a regional building materials company with more than 300 employees has filed for bankruptcy reorganization in the face of plummeting sales. TFI Building Materials Inc. of Anaheim sought protection from creditors' claims under Chapter 11 of the federal bankruptcy code in a petition filed last week in U.S. Bankruptcy Court in Santa Ana. The privately held corporation is a holding company for a string of wholesale electrical, plumbing, appliance and hardware supply businesses that operate under several names in California, Nevada, Utah and Washington.

Company officials could not be reached Thursday for comment. But Newport Beach attorney Marc Winthrop, who is representing TFI in the bankruptcy, said the company has more than $10 million in debt and more than $10 million in assets. Exact totals have not yet been tallied, he said.

Winthrop said the bankruptcy is rooted "directly in the decline in the building industry."

TFI sells supplies to builders "and the market is not doing well enough to give the company very many customers. If they aren't building houses, it is hard to sell toilets and ovens and lighting fixtures."

Winthrop called the case "a classic Chapter 11. We are operating with the use of cash from the company's lender, Midlantic National Bank, and are seeking a court ruling on our petition to allow Midlantic to extend additional credit."

TFI currently owes the New Jersey-based bank "between $7.1 million and $7.2 million," according to the attorney, who said Midlantic is supporting the company's request to borrow additional working capital in the wake of its bankruptcy financing.

In addition to the debt to Midlantic, TFI said it owed a total of $3.9 million to its 20 largest unsecured creditors, including $1 million to GE Credit Corp.

In its bankruptcy filing, the company said it operates TFI Hollywood Appliance Supply, with offices in Santa Ana, West Hollywood, Chino, Palm Desert, San Bernardino and El Cajon; Ward Manufacturing & Supply, in the City of Industry and in Las Vegas; Rio Grande Appliance Supply, in Salt Lake City and Park City, Utah; Rio Grande Building Products in Salt Lake City;

Brennan Commercial, in Kirkland, Wash., and California/Coast Wholesale Electric, in Montclair, Escondido and San Diego.

Winthrop said that the company will close some of its divisions and consolidate sales offices but that only a few layoffs will result.

"This is a distribution and sales business. They don't make things, so there aren't that many people in any one office" to be affected by a closure, Winthrop said.

Winthrop said he was unable to identify which offices would be shut down.

Текст № 16

1. Прочитайте и переведите текст.
2. Составьте 10 вопросов к тексту и дайте на них ответы на английском языке.

An idle plant, an empty town

The gypsum quarry in Empire, Nev., supplied building materials for the housing industry – and a heart for the tiny town. With the plant dark, Empire's homes are fast emptying.

March 29, 2011 By Ashley Powers, Los Angeles Times

Reporting from Empire, Nev. – This state is scarred with remnants of quests to unearth riches beneath the desert.

Scores of Nevada gold- and silver-mining camps boomed momentarily before the ore petered out and the prospectors scattered. Yet, about 100 miles north of Reno, on the edge of the Black Rock Desert Wilderness, the community of Empire worried little about the ephemeral nature of other mining towns.

Theirs had bustled along since the 1920s – when Empire was named for a brand of plaster – and building materials giant U.S. Gypsum Corp. had run things for more than half a century. When Mike Norman was asked on his application in 2006 why he wanted a job here, he wrote: "To be able to work without fear of company closure; have been told this is a great company."

Norman, now 57, and his wife, Barbara, 54, moved from Montana so he could work at USG, the sole reason for Empire's survival. Employees would unearth gypsum at a nearby quarry and truck it to the large yellow plant with rust-colored smokestacks. There, assembly lines churned out plaster and drywall, key components in home construction.

Workers lived in the shadow of the whirring plant, and USG essentially served as mayor, police chief and landlord. Norman did a little bit of everything for the company, including tending to trash and sewers.

Before long, the Normans had woven themselves into the community, where almost everything sat on company land: the two churches, the nine-hole golf course, the store selling hot dogs and DVDs, the two-bedroom apartment that the couple rented for $125 a month. They planned to stay until Mike Norman retired.

They didn't foresee the housing crash that would rip apart the American economy – and Empire along with it. There was, after all, still gypsum left to mine.

Empire was founded by Pacific Portland Cement Co. for the gypsum. When Chicago-based USG took over in the late 1940s, it continued the town's singular focus. There were few other reasons to decamp off State Route 447, which skirts little more than brown peaks and bulbous tufa rocks on its path north of Interstate 80.

In time, there were enough households, here and in the neighboring blip of Gerlach, to fill a two-page phone directory. (The combined population grew to about 500 by 2000, with the majority in Empire.) Locals survived partly on pluck. The Lions Club, for a time, provided ambulance service in a station wagon.

Anna Marks, now 52, arrived in the 1960s when her father was transferred from a USG operation in California. The family rented a blue-roofed home the company had selected for them.

Marks' dad was the plant's quality supervisor. Her mom raised three kids and worked at the general store, which, when it opened, cut down on how often locals had to trek to "town" – meaning two hours to Reno – for groceries. When Marks was in 10th grade, in 1975, the family was uprooted again.

But she so enjoyed her childhood here that she returned as an adult. Then left again. And returned once more, to an apartment not far from the Normans'. While Marks, her husband, Anthony, and their three children missed city conveniences, the cheap rent allowed them to sock away cash.

"I think living here screws you up about money. You're used to living on so little," said Marks' 22-year-old daughter, Monica.

There were other advantages to living in a place where directions involve first names ("Turn right at Anna's house"). Keeping teenagers in line was a cinch. When one of Marks' sons was revving his father's Camaro outside the store, someone immediately ratted him out. The town manager could kick out families who failed to hold their liquor or their tempers.

Marks intended to stay put until she retired from the plant.

A decade ago, hurt by multimillion-dollar asbestos claims, USG filed for Chapter 11 bankruptcy. It emerged in 2006, its sales booming, just before the real estate market began to collapse. "There are just too many homes," said USG spokesman Robert Williams. "The whole country overbuilt."

In 2010, USG announced the permanent closure of five facilities nationwide, including one in South Gate.

It was early December in Empire, and quarry manager Steve Conley had a rotten feeling about the upcoming company meeting. The housing crisis had continued to shred USG's profitability. Sales had plummeted from $5.8 billion to $2.9 billion in four years.

The recession pummeled Nevada harder than most states. Not much need for drywall when two-thirds of homeowners were underwater on their mortgages, and entire neighborhoods were deserted. Operations here had recently been trimmed to a few days a week.

Conley, 58, grew up in Empire and married his wife, Judy, at local St. Joseph, the Worker Catholic Church. They live in Gerlach, across from his parents, in a home with a fireplace mantel he carved from the leftovers of a wooden tram that ferried gypsum. He'd worked for USG for 40 years.

Текст № 17

1. Прочитайте и переведите текст.
2. Составьте 10 вопросов к тексту и дайте на них ответы на английском языке.

Rising construction costs could boost new-home prices soon

The overall price for building materials has been rising year-over-year since the summer. That could mean, in the words of one industry analyst, 'If you want to buy a new house and are in a position to do so, you should do it now.'

February 13, 2011 By Lew Sichelman

Reporting from Washington – With interest rates near rock-bottom levels, most people realize it's only a matter of time before loan costs start to rise. After all, what comes down in the mortgage world always has a way of going up.

But what seems to be forgotten is that construction costs also will eventually go back up too. And the rumblings of that phenomenon are already being felt in most building-product categories.

The question now is, how long can home builders hold out before they start raising their prices to reflect higher production costs? Or, more important, how big a window of opportunity do would-be buyers have before that brand-new home they've had their eyes on becomes unaffordable?

"Builders are resisting raising their prices, but ultimately they're going to have to," said Bernard Markstein, vice president of forecasting and analysis at the National Assn. of Home Builders. "Builders are not going to build at a loss."

Residential construction costs are still down from their peak in September 2008, Markstein said. But the overall price for building materials has been on the upswing year over year since the summer. And in December, the producer price index – published by the Bureau of Labor Statistics for selected building materials – registered its largest gain of 2010, 4.5%.

The month-to-month increases in the cost of key building materials aren't nearly as severe – 0.4% in October, 0.4% again in November and 0.7% in December. But as Markstein sees it, the message is clear: "If you want to buy a new house and are in a position to do so, you should do it now."

Even though hard construction costs have fallen during the housing recession, they now account for nearly three-fifths of the price of a home, according to the latest National Assn. of Home Builders survey. That's a big shift from nine years ago, when construction costs accounted for just half the price of a new home.

With the exception of construction materials, every cost component of building a house – the finished lot, financing, marketing, sales commissions, overhead and even profits – has gone down since 2002, the NAHB said.

Nine years ago, builders were pocketing roughly 12% of the sale price on average as profit. In 2009, the last year for which the home builders association has figures, the typical profit on a new house was 8.9%. And given the state of the market last year, it's probably safe to say profits are still falling.

Not all builders are feeling compelled to mark up their wares. In Chicago, where just over 3,000 new homes were built and sold last year, there is little demand. Consequently, there is little incentive to raise prices, said John Wozniak of J. Lawrence Homes in Wheaton, Ill.

"We used to build 36,000 new houses a year, so we are not seeing much in the way of cost pressure," said Wozniak, the current president of the Home Builders Assn. of Greater Chicago. "But that doesn't mean we are making any money either. We're selling just enough to keep the lights on and a little more."

But London Bay Homes, a builder of semi-custom and custom homes in southwest Florida, is feeling the pinch. "We're working on pretty tight margins now," said Stephen Wilson, the Naples-based company's chief financial officer. "If we don't raise our prices soon, profits would be completely eroded."

Wilson's best guess as to when London Bay's prices might start rising: "It might be another three or four months, but it could be two or it could be six."

Harley Constant, director of purchasing and estimating for Highland Homes, which builds 250 to 300 homes a year in central Florida, doesn't handle pricing. But he assumes his Lakeland-based company will have to start raising prices soon, "probably by the end of March," he said. "We have to pass it along."

Right now, though, prices are the lowest they've been in years. Highland Homes' lower-end models used to start at $130,000 to $140,000. Now they start in the high $90,000s. And London Bay's construction costs are currently 35% to 40% lower than they were at the height of the building boom.

According to Ed Nolan, London Bay's director of purchasing, "Declines in material and product costs as well as labor have created a buyer's market for builders."

For home buyers too. But all that is about to change, owing in large part to the cost of energy and worldwide demand.

Manufacturers continue to report a "troubling head wind" in the cost of their raw materials, according to the most recent monthly survey of building-product companies by Zelman & Associates, a New York financial analysis firm. When asked to specify where the cost pressure is being felt, one maker told Zelman researchers, "Everything. The global economic recovery has driven almost every raw material higher."

NAHB economist Markstein agreed. "All the commodities are up, but lumber is probably up the most," he said.

Текст № 18

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Chinese Display Building Materials

Art at Show : Armand Hammer Urges Exchange of Ideas in Introducing Minister in Charge of Trade Exhibit

Dr. Armand Hammer, that venerable good-will ambassador who is also chairman of Occidental Petroleum, spread a little good will in downtown Los Angeles last week and made an appeal to the American building industry during the opening of what was called "the first Chinese trade exhibition in the United States."

Titled "China Building Materials & Architectural Decorative Arts," the exhibition will be held from 9 a.m. to 6 p.m. today, and Monday through Friday through Nov. 14 at the Design Center of Los Angeles at 433 S, Spring St.

Hammer and Lin Han Xiong, minister of the State Administration of Building Materials Industry of the People's Republic of China, greeted about 400 guests at the opening, where Craig Lawson, a representative of Mayor Tom Bradley, presented a proclamation designating Oct. 27 as China Trade Day in Los Angeles.

Hammer told the group, "I am glad to be invited to this historic event. . . . Today, you will see here many Chinese building materials and products shipped from China for the American public to see and appreciate for the first time.

"I hope that the American building industry will show in China what we have that may improve their living standards. The opportunity for our two countries to cooperate in this field is enormous."

The exhibition features hand-painted tiles, mosaic glass, samples of marble and granite, fiberglass carpet and other textiles and construction materials as well as tapestries, porcelain carvings, cloisonne, paintings, reproductions of ancient pottery, mahogany and marble furnishings, and embroideries.

It is sponsored by the China National Building Equipment Materials Import & Export Corp. of the People's Republic of China and was organized by World China Trade Inc., a Beverly Hills-based company that is planning to break ground in December on a $30-million, 500,000-square-foot mixed-use real estate development in Peking, according to Carole Sumner Krechman, the organization's president.

World China Trade is one of three American sponsors for the exhibition. The others are Price Pfister Inc., a manufacturer of faucets and valves, and Familian Corp., representing numerous manufacturers and distributors of major appliances, plumbing, pipe and solar products.

Two seminars will be given by World China Trade in conjunction with the exhibition. The first, on Wednesday, will be sponsored by the Building Industry Assn. of Southern California. The second, on Thursday, will be sponsored by the International Assn. of Interior Designers. Both will be held at the Design Center at 7:30 p.m. More details may be obtained from World China Trade at 273 S. Almont Drive, Beverly Hills.

Текст № 19

1. Прочитайте и переведите текст.
2. Составьте 10 вопросов к тексту и дайте на них ответы на английском языке.

Shanghai high-rise blaze kills 53

Building materials caught fire at a tower undergoing renovation, and the blaze raced up scaffolding around the structure, a witness says**.**

November 15, 2010 By David Pierson, Los Angeles Times

Reporting from Zhuhai, China – A high-rise apartment building under renovation in Shanghai erupted in flames Monday, killing 53 people and injuring 90, the official New China News Agency said.

A witness said the blaze started when building materials caught fire and spread up scaffolding surrounding the 28-story tower, the news agency reported.

Firefighters facing difficulty reaching the upper levels set up hoses on top of an adjacent building to finally contain the blaze, which raged for more than four hours.

Rescuers were seen carrying survivors out of the building. Earlier attempts to airlift people off the roof with helicopters had to be called off because of thick smoke.

One resident said he and his wife climbed down to safety on the scaffolding from the 23rd floor, where their apartment was, according to the Xinmin Evening Post, a local newspaper.

The man, who identified himself as a retired teacher with the surname Zhou, said he was napping when he was awakened by smoke. He said he rushed through his front door into the hallway and uncoiled a fire hose to extinguish flames next to a window by a stairwell. He and his wife were then able to flee, the newspaper said.

Another survivor, Li Xiuyun, 61, said she hurried down stairs inside the building with her husband, son and granddaughter from their home on the 16th floor, cutting her feet on shattered glass along the way.

"The smoke was very strong and the glass from the windows was scalding," she told the Agence France-Presse news service.

"My son took off his socks and soaked them with water, and we used them to cover our noses. I stumbled on people on the floor when walking," she said at one of the nine hospitals that took in victims.

China's minister of public security, Meng Jianzhu, rushed to Shanghai and called for a thorough investigation through the State Council, the country's Cabinet, the New China News Agency said.

Crews were installing insulation at the time of the fire, the Associated Press reported.

"Construction workers used to litter cigarette butts all around in the building," said a woman surnamed Zhao, the New China News Agency reported. She said she had filed several complaints about the fire hazard.

The 156-unit building, which was built in the late 1990s, housed mainly retired teachers and is in the center of the modern metropolis. Thick black plumes of smoke could be seen over the Shanghai skyline for miles.

Although China has been undergoing a construction boom for many years, building safety has remained controversial.

Last year, firefighters could do little to stop a massive blaze in a nearly completed Beijing skyscraper housed in the same complex as China's state television headquarters. The building, slated to be a luxury hotel, burned after being set alight by an illegal fireworks show.

Critics also point to substandard construction practices as a major source of safety problems.

They cite the collapse of thousands of buildings, including many shoddily built schools, during the deadly 2008 Sichuan earthquake as a prime example of the poor construction common to much of China.

The following year, a nearly completed 13-story apartment tower in Shanghai toppled, killing one worker in a high-profile incident that attracted stunned onlookers for days because the building remained largely intact on its side.

Текст № 20

1. Прочитайте и переведите текст.
2. Составьте 10 вопросов к тексту и дайте на них ответы на английском языке.

Agency Gives Groups Vision of Hope

Philanthropy: Christian relief organization will donate building materials to help 13 Valley churches and charities make quake repairs or expand.

December 10, 1994 ERROL A. COCKFIELD JR. TIMES STAFF WRITER

A team of construction workers and church members have labored for five months to rebuild parts of the earthquake-damaged La Trinidad Church in San Fernando, a task made difficult by inadequate supplies.

But thanks to a shipment of building materials that will be donated by World Vision U. S. early next week, La Trinidad and 12 other churches and charities in the San Fernando Valley will be able to work full-force on their renovation projects.

The Christian relief agency, which also assisted 3,800 families after the earthquake, will donate 25 truckloads of fiber-bond wallboard, paint and plastic supplies in its continuing effort to aid community organizations and those displaced by the earthquake.

"They have donated all the drywall. . . . The material is for the inside of the church," said Ron Laning, superintendent for Colombo Development, which is coordinating the reconstruction project for La Trinidad Church.

The church's sanctuary was destroyed in the Jan. 17 earthquake, forcing the congregation to worship in adjacent rooms. "They almost condemned the whole building, but we were able to save it," Laning said.

"We've gone out and really been intentional about working with a large number of groups in the Los Angeles area," said Tom Konjoyan, a spokesman for World Vision U. S.

World Vision was given 53 truckloads of building materials from Louisiana Pacific. About half was sent to those affected by the Georgia floods, and the rest will be distributed in the Valley to repair quake-damaged buildings and to help charities that need the material for expansion.

The Jeopardy anti-gang youth center, for example, which is run by the LAPD's Foothill Division out of a large warehouse in Pacoima, will use the supplies to add on much-needed rooms, Officer Isaac Galvan said.

The new rooms will be used for boxing, basketball and other sports, as well as counseling centers for at-risk youth and their parents.

"This worked out fantastically for us. . . . (The warehouse) is fine for what it was before . . . but we need the extra room," Galvan said.

The materials, which arrived on three train cars late Friday, are scheduled to be distributed Tuesday at a railroad yard in Panorama City.

"(Without World Vision) we would have still been in trailers until now," said Mike Bishay, pastor at Grenada Hills Community Church, which has received building supplies and at least $75,000 in aid from the agency. The church lost its Christian education facility in the earthquake.

"We were blessed. . . . We didn't call for them, they came to us," Bishay said.

Текст № 21

1. Прочитайте и переведите текст.
2. Составьте 10 вопросов к тексту и дайте на них ответы на английском языке.

Pick healthful indoor building materials and breathe easier

An expert says it's no pricier or difficult to build with health as your top priority.

November 26, 2006 Kathy Price-Robinson Special to The Times

Question: My two daughters suffer from allergies and asthma. When we remodel next year, we need to end up with cleaner indoor air. What should we do?

Answer: My first thought is that you should not live there during the remodel. Even with control measures, construction dust will infiltrate your house.

Drywall dust is the worst. One Manhattan Beach homeowner, «I visited developed long-lasting breathing problems during a massive remodel».

You also should think about minimizing pollutants that will get trapped inside the house, especially during winter, when windows tend to stay closed.

Until fairly recently, indoor air pollutants were considered a limited phenomenon. But two basic changes in construction techniques have altered this. Nowadays, thousands of pest- and rot-ridding chemicals are being incorporated into building materials. Also, as a result of the energy crisis of the 1970s, buildings are now sealed tightly.

The chemicals remain trapped inside, where inhabitants inhale them into their lungs and absorb them into their skin.

It's common to dream of new windows to dress up an old house, but it's often after their installation that indoor air problems turn up. Imagine smelling your breakfast bacon late into the afternoon.

That's a house that needs a filtration system.

To get some guidance on healthful remodeling, I turned to Dennis Allen of Allen Associates in Santa Barbara (www.dennisallenassociates.com), whose firm aggressively pushes for more healthful buildings.

Contractor's answer: If you want a more healthful house, everyone involved with the remodel – designer or architect, contractor and engineers – needs to buy into it. If you cannot find professionals with such a track record, make certain your team members are open to new ideas. If they don't have healthful-house experience, it will be up to you to research the products that go into your home.

The good news is that you can find building materials without harmful chemicals. Most of these products are still not mainstream, but they are available.

With the proper knowledge, it is no more difficult or expensive to build with good health in mind than it is without. But someone on the team (and it may be you) must pay attention to what's going into the home, including the furnishings and cleaning products.

There is a material safety data sheet readily available from the manufacturer of every product. It provides information on the harmful ingredients in a product and their effects on health. Someone needs to gather, read and evaluate these sheets for every product you plan on putting into your home.

That may sound daunting. So, at a minimum, eliminate the main culprits.

First, minimize carpeting. Even carpeting that does not emit chemicals will still trap millions of microorganisms as well as pesticides, mold spores, soil particles and animal waste that get tracked inside. People without allergies may be able to live comfortably with what gets trapped in carpeting but not those with allergies.

Avoid manufactured wood products (plywood, laminated cabinet doors, etc.) with glues that release formaldehyde; most of them do. Use no paints, finishes, adhesives or sealants that emit volatile organic compounds, or VOCs. Because of recent public demand, it's likely that your local paint stores carry non-VOC paints. Just ask.

And finally, steer clear of natural gas water heaters and furnaces that release burned combustion gases into the indoor air. Closed-combustion appliances are OK when their gases are channeled directly outside.

Follow these guidelines, and your air quality can be vastly improved. Still more measures may be required for those with severe sensitivities.

Submit remodeling questions to Kathy Price-Robinson at www.kathyprice.com, or to Editor, Real Estate Section, Los Angeles Times, 202 W. 1st St., Los Angeles, CA 90012

Текст № 22

1. Прочитайте и переведите текст.
2. Составьте 10 вопросов к тексту и дайте на них ответы на английском языке.

Builder to pay 85 workers $242,301 in overtime settlement

The suit alleges that Building Materials Holding Corp. of Boise, Idaho, did not provide overtime or breaks. The company denies wrongdoing but agrees to settle the case.

October 13, 2009 Patrick J. McDonnell

Pablo Nunez, a carpenter by trade, says he is accustomed to working 10-hour shifts, sometimes six days a week, on home-building sites throughout Southern California. But legally mandated overtime pay was almost as unheard of at job sites, he says, as visits from labor inspectors.

"The only person getting overtime might be the brother of the foreman," Nunez said.

The Corona resident is among 85 residential construction workers from California, Nevada and Arizona who will share $242,301 in unpaid wages after settling a federal lawsuit last month against a major home-builder, Boise, Idaho-based Building Materials Holding Corp.

The suit, brought with the help of the Laborers' International Union of North America, alleged that the company and its subsidiaries systematically failed to pay employees for hours worked, did not provide overtime or breaks and kept workers off the clock while they traveled between job sites and waited for materials to arrive.

The company denies the charges but agreed to settle the suit, said William Claster, an Irvine-based attorney for the firm. The company filed for bankruptcy in June.

Claster declined further comment. But industry officials called wage theft an aberration.

"It is essential that builders and subcontractors take care of their employees and follow employment and labor laws," said Julie Senter, a spokeswoman for the Building Industry Assn. of Southern California. "And we're confident the vast majority of the industry does just that."

But advocates say the case illustrates how wage fraud is pervasive in the home-building industry, which relies heavily on immigrant labor, often hired through subcontractors.

What is unusual in this case, they say, is that the workers found a legal recourse.

Most victimized laborers don't have the know-how to file suits, experts say.

A recent academic study surveyed more than 4,000 low-wage workers in Los Angeles, New York and Chicago and found that employees in home construction and other industries are routinely victims of wage theft.

In one finding, the study, by scholars from UCLA, the City University of New York and other institutions, noted that 76% of eligible workers surveyed were not paid the overtime mandated in federal law.

Government enforcement of wage guidelines has been ineffective, the study found.

The number of federal inspectors enforcing minimum wage and overtime laws declined by almost one-third between 1980 and 2007, researchers noted, while the nation's labor force grew by more than half.

Wage theft was the norm in the home-construction industry even during the housing boom years, according to labor activists.

But the practice worsened as home sales ebbed, critics say.

As the bottom fell out of the market, many workers endured slashed hours and pay cuts as a prelude to unemployment.

"It wasn't just the homeowners affected by all this, it was also these workers who were building the homes and creating wealth for others," said David Zacarias, organizing director for the Laborers' International Union of North America.

The union, which is attempting to organize the largely non-union home-construction industry, says it has half a million members.

Jose Ivan Carpio, who is among the plaintiffs in the lawsuit, said he worked for three years for a Building Materials Holding Corp. subsidiary building condominiums in Orange County, earning as much as $14 an hour.

Like others, he said he never received overtime, though he regularly put in 10 or more hours a day, often working Saturdays.

As the industry slumped, Carpio said, his pay was slashed to $10 an hour and his hours dropped.

He was recently laid off, he said, and is now working irregularly, living on savings and unable to send money back to his wife and two children in Mexico.

"We helped this company make a lot of money," said Carpio, 29, "but we saw very little of it."

Nunez, 38, said he has worked for decades in the housing industry, earning as much as $16 an hour as a skilled carpenter.

He was able to buy a home and achieve a middle-class standard of living. But he lost his job as the industry crashed, he said, forcing him to sell his house and move with his family into an apartment shared with friends.

"When times are good, the companies are pressuring you to work more and more hours," Nunez said. "But they never want to pay you what your work is truly worth."

Текст № 23

1. Прочитайте и переведите текст.
2. Составьте 10 вопросов к тексту и дайте на них ответы на английском языке.

Restructuring

Shamrock Holdings mixes it up with cement maker Texas Industries

The Disney family investment company agitates for change at the Dallas building materials supplier and is pushing to place three of its people on the company's seven-member board

September 28, 2009 W.J. Hennigan

It was founded by the family that built the Happiest Place on Earth. But for many executives on the opposite side of the boardroom, Shamrock Holdings Inc. has been more like a house of horrors.

A few years ago, the Burbank investment company owned by Roy E. Disney led a revolt to oust Walt Disney Co.'s then-chief executive, Michael Eisner. It not only was intensely bitter but also thrust the little-known firm into the limelight.

Now it's at it again, this time agitating for change at one of the nation's largest cement makers.

Shamrock, created as an investment vehicle for the Disney family, is clashing with Texas Industries Inc., a Dallas company that it says has potential but is being run poorly. For months, Shamrock has criticized Texas Industries Chairman Robert D. Rogers, saying he runs the company as a "personal fiefdom."

"He doesn't seem to care one way or another about the shareholders," said Stanley P. Gold, Shamrock's president and chief executive. "By almost any metric, the company is underperforming." For The Record Los Angeles Times

Tuesday, September 29, 2009 Home Edition Main News Part A Page 4 National Desk 1 inches; 55 words Type of Material: Correction Shamrock Holdings: An article in Business on Monday about Shamrock Holdings Inc.'s efforts to make changes at Texas Industries Inc. said the Burbank investment company owns shares in Panera Bread. Shamrock sold its stake in Panera in November 2008. The article also said Texas Industries had a seven-member board. The firm's board has nine members.

Texas Industries is the latest among a slew of companies that has been on the wrong side of Shamrock and has paid the price.

Shamrock has shaken up companies both big and small. In an unusual show of investor activism, it has toppled chief executives and has pressured upper management to improve the bottom line. In 1984, it drove out another Disney chief executive, Ron Miller.

Its latest targets – Rogers and Mel Brekhus, Texas Industries' chief executive – believe Shamrock is angling for a takeover. Shamrock has been pushing to place three of its people on the company's seven-member board.

"We can only conclude that Shamrock is agitating for change of control of the company, which we believe will not serve the purpose of creating additional value for shareholders," the executives said in a letter to shareholders in August.

Shamrock's Gold says his firm is merely trying to carry out its long-standing mission: hunt down businesses it believes are poorly run and whose shares are trading below value. When Shamrock finds a company that fits this mold, it invests heavily and lays out a plan to turn the company around. "We're a company that enjoys a challenge," Gold said. "We are serious investors that are tough but always fair."

Gold, 67, has been the driving force behind Shamrock since it was founded in 1978 by Walt Disney's nephew Roy Disney. Gold, a Los Angeles native, previously worked as a lawyer specializing in corporate acquisitions, restructurings, sales and financing.

Gold's intense competitiveness has set the tone for Shamrock. Gold races Porsches – an endeavor he calls a "hobby," and often has a half-chewed cigar in his hands that he frequently uses as a baton to emphasize a point.

Under Gold, Shamrock has gone from an investment fund mainly used as a vehicle to diversify the Disney family's wealth into a multi-pronged investment company that includes five private equity funds with $2 billion in assets. The Disney family has about $200 million invested in Shamrock. Its wide-ranging interests have included a Spanish-language media company, Latin Communications Group, and a soybean processor, Central Soya Co. It currently holds stakes in Panera Bread and Coinstar Inc.

Gold, who has strong political ties to Israel, has also pushed Shamrock to invest more than $400 million in companies in that country. Shamrock says it has had about 30% returns on its investments in the Israeli companies. John Myers, former chief executive of GE Asset Management, which invests with

Shamrock, said he was initially skittish about Shamrock's investments in Israel because of the long history of violence and instability in the region. But when he saw Gold's personal relationships with Israeli political heavyweights such as Prime Minister Benjamin Netanyahu and Defense Minister Ehud Barak, Myers was impressed.

"I haven't seen an American businessman that's better connected over there," Myers said.

Although Roy Disney owns the firm, he turned over the day-to-day operations to Gold from the company's inception. The two met in the early 1970s when Gold helped Disney buy a ranch in Oregon.

They make an awkward pair. Disney is a Republican and Gold is a Democrat. Disney is shy and Gold is outgoing. But it's a friendship that's been financially fruitful for almost 40 years. The company's historical internal rate of return on investments is about 25%, Gold said.

At times, Gold speaks about Disney, 79, more like he were a father figure than a business partner. "From the beginning, Roy has been our mentor," he said. "We take our guidance of integrity and quality from him."

Disney, who has been ill, hasn't visited Shamrock for some time, but his presence is felt throughout Shamrock's three-story office building in Burbank. Pictures of the man and the cartoons that made the Disney franchise famous line the walls on the top floor. Gold's office also features pictures of Disney, who bears an eerie resemblance to his uncle, Walt.

Текст № 24

1. Прочитайте и переведите текст.
2. Составьте 10 вопросов к тексту и дайте на них ответы на английском языке.

Quake simulation tests strength of precast concrete

May 08, 2008 Tony Perry Times Staff Writer

SAN DIEGO – Groaning and trembling slightly, a three-floor, 400-ton concrete structure was playing its part Wednesday in an earthquake simulation project meant to help prepare California for the Big One.

In an obscure area east of Interstate 15, investigators at the UC San Diego Camp Elliott Structural Research Center are testing the strength and flexibility of precast concrete. The goal of the $2.3-million project, funded by government and industry, is to provide better designs to keep buildings from coming apart during large quakes. Nine parking structures, for example, collapsed during the Northridge quake in 1994.

But industry officials believe that advances in the composition and assembly of precast concrete should minimize the possibility of a repeat of the Northridge experience. Precast concrete is put together in a factory and then shipped to a site, not poured wet into forms at the assembly site. To test the latest in precast concrete technology, researchers put the parking structure-like building under the same strain as the 8.0 earthquake that struck Peru in 2007.

Data recorded by monitors will be compared with data collected from a computer model. If it matches, future tests can be done using computer models, a quicker and cheaper process, said Robert Fleischman, a professor of civil engineering at the University of Arizona. Is precast concrete the answer to survival in shake-prone California?

"It's going to be part of the answer," said James Toscas, president of the Precast/Prestressed Concrete Institute, based in Chicago. "Twenty years ago that would not have been the case. That's how far we've come."

As several dozen engineers, researchers and industry representatives watched, the three-level structure was put through a series of simulated quakes with the help of powerful pistons beneath the foundation. The structure shook but did not appear to be damaged.

Tests will continue through next month.

"This is how to find out if these things really work," said Gilbert Hegemier, director of the UC San Diego Jacobs School of Engineering's Charles Lee Powell Structural Research Laboratories.

Текст № 25

1. Прочитайте и переведите текст.
2. Составьте 10 вопросов к тексту и дайте на них ответы на английском языке.

Skepticism Diminishes as New Habitat Homes Rise in Tijuana

Volunteers: Unusual building materials are being tried for the first time as the group puts together the low-cost homes.

June 19, 1990 PATRICK McDONNELL TIMES STAFF WRITER

TIJUANA – Three years ago, Adan Huesca Paz, a poor construction worker residing in the city of Puebla, joined the exodus of his countrymen heading to the north.

But, frustrated after being arrested by U.S. immigration authorities, Huesca decided to settle in Tijuana and attempt to capitalize on the possibilities of a fast-growing city that is a boom town by Mexican standards.

His wife and seven children eventually joined him in a squatter's dwelling on the city's eastern edge. While much has been written about Mexican emigration to the United States, Huesca and his family are indicative of the often-parallel but less-discussed migration to Tijuana and other Mexican border cities where tourism, international trade and foreign-owned assembly plants have created a huge job pool.

This week, the 42-year-old Huesca, a construction laborer by trade, finds himself in the unusual position of building his new home alongside co-workers who include former President Jimmy Carter and his wife, Rosalynn. The Huesca family is among 100 who have been selected to receive new, low-cost homes being built as part of the *Milagro en la Frontera*– or Miracle on the Border– project sponsored by Habitat for Humanity, the Georgia-based self-help group closely identified with the former President.

"I guess it's just coincidence that he (Carter) happens to be working on my home," Huesca said Monday, after he, the Carters and other volunteers had raised the walls and started work on the roof, windows and doors. "The President said a few words to me, but his Spanish is limited, like my English. But he seems like a good man."

The five-day Tijuana-San Diego effort – volunteers are also slated to build seven houses in San Diego's Encanto neighborhood – is the 14-year-old organization's most concentrated, "blitz-building" undertaking to date, officials said. The Habitat group, which provides low-cost dwellings for the needy, has sponsored projects in more than 600 communities in 31 countries.

This week, about 1,100 volunteer from throughout North America, and a number from Europe, are living in a tent city on the edge of the poor Tijuana neighborhood where the new homes are being constructed. The Carters, like others, are sleeping in a two-person dome tent, using portable toilets, eating three daily meals in the communal mess halls, and living the no-frills work-camp life that they have shared in seven other Habitat projects. The former President, looking lean in cotton shirt, jeans and sneakers, said the current project on the international border, along with its quick pace, has lent the entire effort a special meaning.

"This is by far the most interesting, by far the most challenging, and by far the most gratifying project," Carter said Monday during a news conference in front of the future Huesca family home.

The former President then responded in halting Spanish to a Mexican journalist's query about the purpose. "The objective is to construct comfortable and adequate housing in this community," said Carter, who also fielded questions during the day about topics ranging from peace prospects in the Middle East to the state of the Mexican economy.

The simple homes being built in Tijuana are different from anything that Habitat has ever constructed. Builders are utilizing singular methods and materials – walls are made of 2-inch-thick slabs of lightweight, plastic foam.

During the construction process, workers encase the foam in steel wire mesh. The structure is then covered with concrete. A Tijuana company, Grupo Muzquiz, provided the materials at cost. The two-bedroom houses are about 34 feet by 20 1/2 feet in size.

Because of the unusual building methods, Habitat officials have nicknamed the project "Coffee Cups and Coat Hangers." The several-acre building site is now a tableau of white foam, metal mesh and wood rafters, constantly being traversed by volunteers and future residents toting tools, along with journalists lugging cameras and notebooks.

The hope voiced by Carter and others is that the unusual technique will provide a quick and low-cost alternative in poor areas, particularly in Third World regions where building materials are scarce. However, to many area residents, the process remains suspect, despite assurances by Habitat officials who say the materials have been tested. "When I first saw it, I didn't think it would hold," said Adan Huesca, who was among the initial skeptics. "But now I can see it is strong. I'm not worried."

In many ways, Huesca and his family are emblematic of the kind of migrant whose presence has bloated the population of Tijuana and other Mexican cities in recent years, further straining already thinly stretched services and creating severe housing shortages.

Текст № 26

1. Прочитайте и переведите текст.
2. Составьте 10 вопросов к тексту и дайте на них ответы на английском языке.

Ignoring nature, we build our way into fire's path

October 30, 2007 Christopher Hawthorne Times Staff Writer

The enduring image of the Southern California hillside resident – the one who braces for disaster every fall, just as the Santa Anas begin to blow – is that of a self-reliant, latter-day homesteader who settled up among the trees because he finds solitude and freedom there. And maybe because he remains a bit suspicious of life in the city.

It wasn't hard to find examples of the breed in news coverage of last week's devastating fires, guiding horses to safety or crustily refusing to evacuate. Yet the vast majority of the nearly 2,000 houses destroyed so far weren't outposts marking the last remaining frontiers of the American West. They were neatly lined up in subdivisions, on gently curving streets slotted into terraced hillsides. Many of the biggest fires grew by leaping from one cul-de-sac to the next, tearing through the territory that writer Mike Davis once called "Sloping Suburbia."

Since the middle of the 20th century, this is how we have developed much of our new housing in the U.S., and particularly in Southern California: by pushing deep into canyons and deserts and onto flood plains. We build reassuringly familiar-looking subdivisions, decorated with vaguely Spanish or Mediterranean accents, in locations that by land-use standards – and by common-sense standards – are truly exotic. We build with the unstinting belief that growth is good and that progress in the form of various kinds of technology – new building materials, military-style firefighting, a vast system of pumps and levees – will continue to make it possible to construct new pockets of nostalgic architecture virtually anywhere.

But maybe our nostalgia should extend beyond red-tile roofs to include earlier lessons about how and where it is safe to build. This country's culture as a whole is in the midst of a profound shift from the unshakable confidence that marked the so-called American Century to a new recognition of risk, conservation, even fragility. Green architecture, with its rather old-fashioned emphasis on paying attention to site and climate, is part of that shift. But those who build and approve new hillside developments – "the lords of subdivision," as nature writer Richard Lillard called them, the "replanners of the Earth's surface" – have barely acknowledged it.

One of the success stories of the last week has been Stevenson Ranch near Santa Clarita, which narrowly averted destruction in part because its houses were built with concrete roof tiles and heat-resistant windows. But to celebrate this neighborhood as a model for escaping fire is itself a kind of escapism. The question is never, why am I building here on this hillside that predictably catches fire every few years in the fall (and maybe now in spring or summer too)? It is, instead, how can technology and new materials – how can progress – protect me from the dangers inherent in living where I have chosen to live?

The aesthetic basis of a typical subdivision is reassurance and stability. Builders enforce those qualities with architecture, choosing from a well-worn catalog of residential styles, and with massive earthmoving operations, to flatten the streets and blur the topographical differences between one hillside and the next.

The media pitch in too. Thursday night on CNN, Anderson Cooper and other anchors focused relentlessly on the news that an arsonist may have set the Santiago fire in eastern Orange County. The Santiago fire destroyed 14 houses – a tiny fraction of the total this week. By contrast, the Witch fire that roared through suburban developments in northern San Diego County, consuming more than 1,000 houses, was caused by downed power lines. The emphasis on possible crime suggested that the disaster could be pinned on a few rogue evildoers. But the vast majority of destroyed houses burned as a direct result of choices made by home builders, homeowners, politicians and planners about where to put new development. The villain is us.

The truth is that while houses near Lake Arrowhead and in certain canyons that burned this year are marked by real isolation, most Southern California residents who move into fire-threatened hillside neighborhoods are not adventurous souls hoping to thumb their noses at convention and urban mores and carve out a life surrounded by nature. They are merely looking for spacious single-family residences that feel attractively adjacent to, rather than in the heart of, the hills and mountain ranges that divide the region's coastline from its deserts.

Adjacency to nature rather than full immersion in it has always been at the heart of the suburbs' appeal. The developers who create our version of it, particularly in the fastest-growing parts of Los Angeles, Orange and San Diego counties, have been highly successful at giving their projects the air of the familiar mixed with a touch of unspoiled landscape.

Текст № 27

1. Прочитайте и переведите текст.
2. Составьте 10 вопросов к тексту и дайте на них ответы на английском языке.

Through the roof

As building-material costs soar, homeowners are scaling back on remodels.

June 11, 2006 Gayle Pollard-Terry Times Staff Writer

DIMITRY ROSHKOVAN, a Woodland Hills contractor, believed he had a big job lined up last fall. But in the six months it took the client to hire an architect and have blueprints drawn for a large addition, Roshkovan's estimate went from $170,000 to $250,000 and the Northridge homeowner abandoned the project.

The contractor blames at least part of the increase on the soaring prices of building materials, which generally account for about 30% of the cost of a major home-improvement project. Also figuring into the equation are rising energy, labor and insurance costs, including workers' compensation. "Everything went up drastically in the past year ... from nails to drywall," said the owner of A to Z Construction & Remodeling Co.

Since April 2005, the price of copper pipe and tubing has risen nearly 71%; the gypsum products used in drywall, 24%; asphalt shingles for roofing, 19%; and ready-mix concrete for foundations, 12%, according to Reed Construction

Data, a construction information company based in Norcross, Ga. The exceptions are framing lumber, which stabilized after rising sharply in 2004 and 2005 and is down 5%, and plywood, down 2%.

It's all part of an upswing that has seen building supply costs outpace the rate of inflation for at least two years, largely because of strong demand, and that is adding to the cost of remodeling projects and new homes.

"Copper gutters, copper roofing, copper stuff we used to do 10 years ago as a design feature, we just don't do it anymore because it's prohibitive," said Clint Whitman, chief estimator for Tarzana-based Matt Plaskoff Construction, which specializes in remodels costing from $300,000 to $700,000.

But the metal isn't just a decorative option in home building. There are about 440 pounds of copper in a new 2,100-square-foot single family home, according to the Copper Development Assn., including about 200 pounds in wire and about 175 pounds in pipes and fixtures for homes with copper plumbing.

That alone would add $500 to the cost of a new home, said Michael Carliner, an economist with the National Assn. of Home Builders.

The increased cost of building materials will on average add $6,000 to the expense of building that 2,100-square-foot house this year, Carliner estimated. Nationally, in the last three years, the higher prices for construction supplies have added $20,000 to the cost of a new home, he said.

With this in mind, why the huge increases on some bids in just a matter of months?

Deciphering the economics of a contractor's quote requires expertise that few homeowners possess. But to avoid overpaying, prosecutors, consumer affairs departments and the national Consumers Union recommend rigorous comparison shopping.

Get at least three bids, verify the contractor's license with the state board, talk with at least three references, visit other jobs to determine the quality of craftsmanship, look for experience and credentials, check for proper liability insurance, don't be rushed or pressured into signing a contract, make sure the contract includes all spoken promises and ask for a detailed timetable.

Specifying materials and their costs is another recommendation. But keep in mind, when compared to last year's prices, most construction supplies cost more today.

Competition from other countries for building materials and the lingering demand from Hurricane Katrina rebuilding, as well as rising energy prices, are behind the price increases, according to experts.

"There was a great deal of extra demand last year in rapidly developing countries of the world like China and India," said Jim Haughey, chief economist of Reed Construction Data, from his office in Waltham, Mass. "Concrete is one of the big problems. Building in Latin America and Europe and the rest of Asia has picked up, and they are out looking for cement too." This is compounded by a lack of new cement plants to keep up with demand, said Ken Simonson, chief economist for Associated General Contractors of America, a national trade group. For environmental reasons, "nobody wants a cement plant in their backyard or the next county."

U.S. contractors also depend on imported cement, which means competition for space on ships and adds freight costs, Simonson said. Southern California faces an additional problem: finding the gravel to mix with cement, he said. "It's really hard to get the permits to open gravel pits." Meanwhile, the price of lumber is moving down a bit.

"Demand is off," said Shawn Church, editor of Random Lengths, a Eugene, Ore.-based newsletter that tracks lumber prices. "And there has not been a commensurate reduction in output production."

When a booming housing market, falling interest rates and aggressive speculation boosted demand, the price of framing lumber rose to $473 per thousand board feet in August 2004, from $271 in January 2001, about the time the run-up began. By April of this year, it had come down to $367, according to Random Lengths.

Текст № 28

1. Прочитайте и переведите текст.
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Firm's History Is Set in Concrete

As O.C. grew, so did Orco. Its blocks are seen in walls throughout the county, thanks to a co-founder who once focused on doughnuts.

September 05, 2005 David Reyes Times Staff Writer

Three generations of Muths built their company block by block. In doing so, they also helped build Orange County – one 35-pound concrete block at a time.

Orco Block is headquartered off Beach Boulevard in Stanton. Fittingly, there is a 12-foot-tall concrete block near the curb.

Since 1946, the company has pumped out millions of 8-by-8-by-16-inch blocks – made of sand, cement, water and rock – that helped supply the county's postwar building boom. Homes needed walls; subdivisions needed enclosures.

"More than half the concrete blocks in the county were manufactured at an Orco plant," said Rick Muth, 56, president of the company.

Muth's brother Lynn is a vice president and manages the family's business holdings. Their father, Peter, founded the company with his grandfather, uncle and a business partner. They named their company after Orange County.

The Muths manufactured block in the 1960s for a miles-long wall that developer Ross W. Cortese wanted at his Leisure World retirement development in what is now Laguna Woods. Orco made the block for the wall that surrounded the initial development that later became Mission Viejo, and its block can be found at the Irvine Spectrum, Ladera Ranch and numerous schools and universities.

Doughnuts gave Peter Muth the inspiration to get into the business.

"At the time, my dad was baking doughnuts in Santa Ana and he wanted to get into something more permanent," Rick Muth said.

As his dad walked down Main Street in Santa Ana one day, he noticed workmen with a pile of sand and gravel. Intrigued, he asked what they were doing and was told they were making concrete to make the blocks.

The workmen said a partner had quit and that they needed someone to join them. Peter Muth jumped in with $8,000 he borrowed from his father and uncle, and the group opened Orco Block in Santa Ana.

"After all, doughnuts and block had two things in common: You bake 'em and they both have holes in the center," Rick Muth said.

In 1953, the company moved to a bigger, 14-acre plant in Stanton. The family didn't know it at the time, but Orange County's population was about to explode – and it was going to make them rich.

After the war, thousands of GIs who had liked the area decided to return and make it their home. In the 1950s, the completion of the Santa Ana Freeway, the decline of profitability of citrus groves and the growing military industry turned Orange County into Los Angeles' booming suburbs.

Homes were needed. And homes needed block walls.

Competition among rivals was stiff, Muth recalled. But the family had a strategy to invest in expensive block-making equipment that helped them keep pace with demand by spitting out 1,500 blocks an hour.

"Business was getting cutthroat," Muth said. In 1946, there were about 150 block manufacturers in Southern California. Today, he said, 11 remain.

Peter Muth's big break came when he struck a deal to produce block for Leisure World.

"For my dad, it was a great deal of satisfaction that Leisure World chose him to make the blocks for its wall, and it meant a lot to the company. It helped the company stay alive," Rick Muth said.

At the time, competitors wanted to buy the company.

"We had a competitor who came to us and said, 'We're going to build a beautiful new plant.' Then he paused, looked at us and continued: 'You can sell your business to us now, but we're not promising you any blue sky.' "

Muth's dad said no.

In 1969, Orco Block's answer was to expand. Peter Muth bought 15 acres in Glen Avon, Riverside County. By 1989, the company had added two more plants in the county, bought out competitors in Banning and Oceanside and bought land for yet another factory, near Perris.

Today, the company has grown from the four partners and two employees to a workforce of 240.

Peter Muth, who became a prominent philanthropist, died in 2003 at 88. He left behind a company that earns an estimated $50 million a year. Each year, Orco makes enough blocks to build a 6-foot wall stretching from the Mexican border to the middle of Oregon.

For Orco Block's workers, being a part of the company is like having a role in the county's history.

"I drive my wife crazy," said George Spickelmier, a yard manager who has worked there 34 years.

"Everywhere we go in the car, I'll stop and say, 'We did that wall. That's our block.' I point it out on schools, on buildings, structures ... everywhere."

Текст № 29

1. Прочитайте и переведите текст.
2. Составьте 10 вопросов к тексту и дайте на них ответы на английском языке.

Grace Under Pressure

All dressed up and in all the best places, plywood is having its moment as a high-style design component. If you think it's only a building material, you haven't been paying attention.

July 21, 2005 John Balzar Times Staff Writer

You notice the plywood first. Cross the threshold into Wade Robinson's Silver Lake home and the space inside the walls seems to gather a breath of air and expand to contain a floor laid in sheets of butter-colored, natural birch plywood. The art on his walls shows off plywood too – both the frame and what's inside the frame. The petal-shaped CD case in the corner is cut from plywood. The industrial-style closet chest in his daughter's room is varnished plywood. The Modernist dresser he made his wife is plywood.

There would be more except that Robinson is a hot item right now as an interior designer and builder, and he has a mountain of commissions to occupy his attention.

"It is so viable and so pliable," Robinson said of plywood. "If you do it right, it's art itself."

There are a few generalizations we can make about plywood these days: First, you see a lot of it around town. Second, it's still sometimes a hard sell. Third, technology is extending its possibilities.

If you smell the ingredients of a "trend," you're on to something. Plywood, that lowly industrial workhorse of the lumberyard, is in fashion, again – not simply as a structural material, but increasingly as a visible part of homes and furnishings.

Somewhere short of everyday mainstream but not all-out daring either, plywood has made the long leap from midcentury 1950s Modernism to an ever more versatile home accent for this millennium. Depending on when you caught wind of it, the trend has been years in the making, or you could imagine that it's really just starting.

Floors, walls, ceilings, cabinetry, countertops, chairs, tables, even exterior paneling – it's hard to argue with wood that is stronger than wood, wood that is more flexible than wood, wood that is more stable than wood, and wood that, pound for pound, gives you a lot more wood for your money – remembering, of course, that it's still wood all along.

"I think it's coming," said Robinson. "To some extent, it's here."

Something else about plywood: It alters the scale of things. A board, even a wide board, is but a slice into the beauty of a tree. A sheet of plywood opens up the tree for our eyes – a circular girdle peeled from a log and pressed flat into a grained page more expansive than the tree itself.

Robinson's plywood floors, finished with a clear coating that brings out the sunshine hues of birch, were inspired by the grand dimensions of marble slab floors.

The result is not only the eye-holding drama of 4-by-8-foot panels, wall to wall in an ordinary-sized living space, but simultaneously, Robinson said, "I think I achieved a warm, homey look." Besides, he added, "It feels good; it makes me feel good." Not waiting for a cue, Robinson's 9-year-old daughter, Taylor, emerged from the kitchen to demonstrate plywood's adaptability as a surface for indoor skating.

Plywood that is on display for the eyes to see, as opposed to the hidden-away construction plywood that forms the hulls of our houses and furniture, might also be a cultural signpost of the age in which we find ourselves, if one is of a mind to think that way.

In an interview, San Francisco-based design historian and writer Dung Ngo offered a review of the contemporary cultural history of plywood, which reached its apogee in the years following World War II: "I would say that plywood had a continuous run from the 1940s to about 1975, when it went into decline. It is not coincidence that the end of the Vietnam War era, where values that we ascribe to plywood – integrity, honesty, optimism, exuberance – were in short supply in American culture."

The coauthor of the authoritative illustrated history of modern plywood furniture, "Bent Ply," Ngo continued: "In the 1990s there was enough critical distance to 1950s values that such things were appreciated again, at least in our material culture.... Its characteristics are ones that we can describe as values of democratic society. Its beauty lies as much in the inherent nature of wood grains as in the fact that it is available, and appreciated and used by all segments of our society, from factory floors of the working class to the custom high-end cabinetry of millionaires, from the garage woodshops of our weekend warriors to the kitchen countertops of our cultural elites. Plywood has permeated not only our physical homes, but also our cultural psyche." All said, though, some homeowners still need coaxing.

"I often try to talk people into plywood," said Robinson. "At first, their jaws drop. To be honest, it's sometimes hard ... to talk people into plywood. It still has a 'subfloor' connotation to it." Little do they know.

Текст №30

1. Прочитайте и переведите текст.
2. Составьте 10 вопросов к тексту и дайте на них ответы на английском языке.

Stucco: the marble of suburbia

The popular building material moves beyond its mundane image to show a graceful, soft side.

April 14, 2005 Veronique de Turenne Special to The Times

Stucco. It's one of the oldest construction materials we know, one of the easiest ways to cover a building, used on everything from chi-chi mansions to rude mud huts and yet – stucco. Just the sound of it. Root word: stuck. Rhymes with yucko. Rhythmically similar to uh-oh. Where's the respect?

Everywhere, if you know where to look.

Revered modern architects Frank Lloyd Wright, Richard Neutra and Frank Gehry used stucco on some of their most famous houses. Father Junipero Serra's missions are covered in a historic version of the stuff. And if you've ever marveled at the smooth, satiny finish on many of the ruins in Rome or Greece, that was an ancient form of stucco that you were admiring.

Stucco got a bad rap during the post-World War II building boom. In the West and Southwest, where brick and stone were too scarce and too pricey to use as building materials, stucco became the siding of choice. Hundreds of thousands of affordable homes were slathered with the stuff. Shot from a pressurized spray gun in a limited range of timid colors, mass-produced stucco had a cheap and, some felt, tacky look.

During the building boom of the last 15 years, however, architects and designers have taken a new look at the ancient siding material. By playing with depth and texture, form and color, they have rescued stucco from its cookie-cutter oblivion and turned it back into a building material with heart and soul.

"When it's done well, stucco is a beautiful building material," said Mark Billy, an architect in South Pasadena. "You can do a super-heavy texture which changes with the light and gives you a sense of sun and shadow, or you can have a smooth finish with a sheen on the plaster and a kind of translucence. In the hands of the right designer, it's never going to go away."

So what is stucco? Until the late 1800s it was primarily a lime-based coating used mostly on homes and small commercial buildings, according to historians with the National Park Service. The popularization of Portland cement at the turn of the century revolutionized stucco, making it stronger and easier to use. The increased versatility was a turning point. Not only did stucco become a popular choice of siding material, but it also gave American architects a new design direction.

Instead of imitating European buildings, they began to experiment and, as the use of stucco became more widespread, an American vernacular was born. In seismically active California, stucco proved to be a perfect sheath for the light, flexible wood-frame houses that were best at withstanding the torque and tumult of even the smallest earthquakes. Add in the relatively low cost and it's no wonder it became ubiquitous.

"Stucco is the suburban Carrera marble," wrote author D.J. Waldie, in whose first book, "Holy Land: A Suburban Memoir," stucco covers Southern California like a skin. "All you need is sand, water, cement and a strong arm and you can turn a stack of sticks and chicken wire into a home."

A safe home.

"The best place to be in an earthquake is cheaply built, wood-frame stucco houses because if they fall apart around you, you're not being buried in a lot of brick and mortar," Waldie said. "Plus, it ties into the mythology of L.A. as an insubstantial place. Its very qualities fit the character of our landscape."

Modern-day stucco, most often a cement-based exterior plaster, is applied as a multipart coating. With masonry – brick, stone or cement block – you can apply stucco directly onto the building. Wood or log structures, however, require a framework of wood or metal lath for the stucco to adhere to.

How this coat is applied makes all the difference, architects say. Future trends tend toward a bolder use of color, with deep, earthy tones of red, yellow and brown increasing in popularity.

In high-end homes, stucco is often applied by hand so the texture and trowel marks become an intrinsic part of the design. It's a far cry from the lumpy, bumpy sprayed-on version of stucco that gave it such a bad name. "Stucco gets a bad image because it's common," said Santa Monica-based architect Hank Koning, who, with his partner, Julie Eizenberg, has designed award-winning affordable housing that is swathed in, yes, stucco.

"Cottage cheesy – that's the yucko stuff," Koning said. "It's done that way because they can spray the stucco on and walk away. But in three weeks, it's dirty. You can see buildings on commercial corridors in the city, with buses rumbling past, blasting diesel fumes that get stuck in the little crevices and makes it all look really nasty."

Stucco applied by hand, however, can be sublime.

"Trowel it on with a steel trowel and it becomes very smooth, very beautiful," Koning said.

"The great Spanish adobe buildings are gorgeous, smooth, with not a lot of texturing and with the trowel marks that you can still see."

Текст № 31

1. Прочитайте и переведите текст.
2. Составьте 10 вопросов к тексту и дайте на них ответы на английском языке.

The second time around

Savvy remodelers are saving money and gaining a vintage look by reusing salvaged items – doorknobs, tile, wood and more.

April 03, 2005 Chuck Green Special to The Times

Rene SPENCER was tooling around her neighborhood one day a couple of years ago when the sight of a home demolition stopped her in her tracks. The Long Beach resident had just purchased a Craftsman home built in the 1920s and wanted authentic materials for an extensive renovation the house required.

With the contractor's permission, she retrieved door trim and a stove that would have been destined for the dump.

"I just happened to be driving by," said Spencer, whose resourcefulness has yielded reclaimed lighting fixtures, ceiling fans, doorknobs, a picket fence and even a ladder for her attic.

In recent years, remodelers have found an increasing supply of recycled building materials available. The state's Integrated Waste Management Act of 1989, considered landmark legislation in the nation's recycling movement, mandated that cities reduce the amount of waste going to landfills by 50% in 2000. With the statewide recycling push and dwindling space in landfills, home builders such as Keith Brown, owner of K.B. Construction Co. in Monrovia, have felt increasing financial pressure to recycle construction materials. "We find the costs at the dump are much more expensive now due to the lack of landfills," he said.

Consequently, Brown has turned to organizations that accept donations of building materials, both new and used, such as the San Gabriel Valley Habitat for Humanity Builder's Surplus Store in Pasadena, where he previously was a board member. Habitat provides a list of its Southern California stores on its website at www.habitat.org.

"We probably save $2,000 or $3,000 a year in dump fees," Brown said, "and we give the materials to a good cause, so it's a win-win situation."

Spencer's recyclables sources include organizations such as Habitat for Humanity, tips from friends and Craigslist at www.craigslist.com, a website where consumers or companies can advertise the availability of or need for goods. She also has continued to prowl her neighborhood.

"I had to repair holes in the walls, so I went around and found other houses where they were doing remodels," Spencer said. "The house was a total fixer; it needed everything."

Spencer estimated that she saved roughly $5,000 on materials by using other nonvintage reclaimed materials, such as interior doors, lumber, fixtures, paint, tile and landscaping.

Inland Empire resident Rene Jarboe was at the point where she would have given almost anything to upgrade her kitchen, which has remained in "pretty ugly" condition for the last two years while she and her husband, Kim, focused on the rest of the home they and their two children live in. Now, thanks to recycled cabinets from the San Gabriel Valley Habitat for Humanity store, the couple's kitchen will soon take shape.

"I've waited patiently, and now that the cabinets have come in, we're going to start ripping the kitchen apart," Jarboe said. The Jarboes, both 41, saved more money than they originally realized by purchasing the cabinets, which were used, from the Habitat store instead of a retail outlet.

"We made a mistake in some measuring, and the sink base we have wouldn't fit. When we looked into getting another base, we learned the cabinets are worth thousands of dollars," she said. "The pantry alone, if we were to reorder it, would be $1,000, and we got everything for the whole kitchen for a little more than $1,000, so we saved a ton of money."

But recycled materials don't always yield huge savings.

"I tried to save money and get most of my stuff for free, but there was no free," said West Los Angeles resident Scott Hill, an environmental consultant who has purchased and sold salvaged materials online.

Hill is using a number of salvaged materials to add a room and a second floor to his home. "With the demolition, the de-nailing, de-painting, stacking, loading and hauling of materials, there are expenses," he said.

Labor can be a significant one. But the fact that Kim Jarboe is a carpenter helped the couple save money. "Our last home was a fixer-upper too, and he redid the whole thing himself, using a number of recycled products," Rene Jarboe said.

Whether a homeowner is a carpenter or not, she said, one trick to finding the right recycled materials is doing your homework before going to the Habitat store: "There are a lot of treasure finds there if you know what you're looking for. To the average person, it might look like a bunch of old stuff sitting around, but if you have an eye for it, if you measure and know what you need, you can make it work."

David Berman had "environmental consciousness" in mind when he tried to give away materials from his Rancho Palos Verdes teardown a couple of years ago.

"I wanted some of the materials to go to good use," he said.

"My demolition guy arranged for some of the materials to get taken away. But we found trying to recycle materials a major headache," said Berman, a 45-year-old physician. "It would have been easier to just have them dump it in the trash."

Текст № 32

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Hit the Dimmer, Disney Hall Is Told

March 02, 2005 Natasha Lee and Jack Leonard Times Staff Writers

Officials decided Tuesday to make part of Walt Disney Concert Hall a little duller.

Construction crews are set to take hand sanders to some of the shimmering stainless-steel panels that have wowed tourists and architecture lovers but have baked neighbors in condominiums across the street.

Beams of sunlight reflected from portions of the hall have roasted the sidewalk to 140 degrees Fahrenheit, enough to make plastic sag, cause serious sunburn to people standing on the street and create a hazard to passing motorists, according to a report from a consultant hired by the county to investigate the problem.

The effort is already setting off a debate about whether it is right to alter one of Los Angeles' architectural landmarks, especially less than 1 1/2 years after the $274-million complex opened.

For The Record Los Angeles Times Friday March 04, 2005 Home Edition Main News Part A Page 2 National Desk 1 inches; 53 words Type of Material:

Correction Disney Hall – An article in Wednesday's Section A about plans to reduce the glare caused by sunlight reflecting off the exterior of Walt Disney Concert Hall said the county paid $137,000 for a glare consultant's report. That payment was for an addendum to an environmental impact report, which included the consultant's report.

"It's like putting a little more hair on the Mona Lisa or making her smile a little bigger," said Denise Crouse, who takes in the spectacular view of the hall each morning on her way to work at the downtown offices of Pricewaterhouse Coopers. "An artist's work should stay an artist's work." But neighbors and office workers who stroll past the hall cheered the Los Angeles County Board of Supervisors' unanimous approval of the sanding project.

"I will just appreciate not having the glare," said condo resident Jacqueline LaGrone, who said that her air-conditioning bill had doubled during summer months since Disney Hall opened and that the glare made it impossible to sit on her patio on hot days.

"It's about time," added Sheila Nixon, a Department of Water and Power employee who regularly walks around the hall for exercise. "We feel like ants under a magnifying glass."

Architect Frank Gehry's firm agreed to the fixes, which affect 4,200 square feet of polished stainless steel panels atop the Founders Room and on the marquee above the entrance to the Roy and Edna Disney California Arts Theater, known as RED CAT.

Those sections of the hall produce the strongest glare because their sharper curves magnify the sunlight, bouncing light off each other and into a beam. Also, while most of the hall is clad in duller brushed steel, those areas are sheathed in a much more reflective polished steel. When the work is completed later this year, the sanded portions of the surface will look more like the brushed steel.

Pauline Saliga, executive director of the Society of Architectural Historians, said she doubted that the changes would drastically alter the hall's look, though she was surprised designers hadn't planned better to prevent an obvious problem such as glare in Los Angeles.

She pointed out that Gehry had to rework another landmark building, the library at Case Western Reserve University in Cleveland, after snow and ice slid off the curvy, stainless steel roof and crashed onto the sidewalk below. "Even great architects make mistakes with materials and designs," she said. "I think you just have to admit it and you have to be pragmatic about it and alter that design if necessary. Architecture is a functional art form, so it really does have to function."

Major urban buildings such as Disney Hall routinely undergo modifications once construction is completed, said John Kaliski, a former principal architect for the Los Angeles Community Redevelopment Agency now in private practice. "It's not that unusual to spend a certain period of time to go back and adjust things to make sure that they work," he said. "If that is the only thing that anyone can pin on this building as being somehow problematic, I would say that it's an incredible triumph."

A spokeswoman for the Music Center of Los Angeles County, which built and operates the hall, said the performing arts complex was trying to be a good neighbor.

"We put a lot of effort in to make sure that this will take care of it," said Catherine Babcock, the center's director of marketing and communications. Workers doing the sanding will have to hang over the edge of the hall's roof to reach the affected panels above the Founders Room, an exclusive sanctuary for the wealthiest donors.

The Music Center will pick up the $90,000 tab for work on that section, which overlooks the intersection of 1st and Hope streets. RED CAT, at Hope and 2nd streets, will pick up the estimated $15,000 to $20,000 bill for sanding its marquee.

Gehry's earlier design for the hall included only dull, brushed stainless steel for its roof. But during construction, county officials said, the architect added mirror-like panels to the two sections that will now be sanded.

Officials with Gehry's firm have insisted that they took into account possible glare but that the curved panels were erected at slightly different angles than called for in their design. They did not return calls for comment Tuesday. Even before Disney Hall opened in October 2003, complaints about heat and glare surfaced, prompting the Board of Supervisors to commission a report from glare consultant Marc Schiler at a cost of $137,000.

Vocabulary

Part 1.

1) **building materials** – строительные материалы (С. м.), природные и искусственные материалы и изделия, используемые при строительстве и ремонте зданий и сооружений. Различия в назначении и условиях эксплуатации зданий (сооружений) определяют разнообразные требования к С. м. и их обширную номенклатуру. Различают 2 основные категории С. м.: общего назначения (например, цемент, бетон, лесоматериалы), применяемые при возведении или изготовлении разнообразных строительных конструкций, и специального назначения (например, акустические, теплоизоляционные, огнеупорные материалы);

2) **clay –** глина, мелкозернистая осадочная горная порода, пылевидная в сухом состоянии, пластичная при увлажнении. Свойства глин: пластичность, огневая и воздушная усадка, огнеупорность, спекаемость, цвет керамического черепка, вязкость, усушка, пористость, набухание, дисперсность. Глина является самым устойчивым гидроизолятором – водонепропускаемость является одним из её качеств;

3) **wood –** древесина, древнейший материал, уникальный по обеспечению эргономичности, естественной экологии жилища, гигроскопичности, неограниченного срока службы, ремонтопригодности. Дерево накапливает тепло, а затем отдает его обратно в течение долгого времени. Деревянные части зданий и сооружений собирают на строительной площадке из элементов и конструкций, изготовленных на деревообрабатывающих предприятиях. Работы по устройству деревянных конструкций разделяют на плотничные и столярные. К плотничным работам относятся изготовление и монтаж основных конструкций, например элементов стен из бревен и брусьев, дощатых полов, к столярным – устройство отдельных конструктивных элементов и деталей с тщательно обработанной поверхностью, например, оконных и дверных блоков, встроенной мебели, отделочных деталей и др.;

4) **rock –** камень, натуральный строительный материал.

Горные породы, используемые в строительстве. К ним можно отнести мрамор, гранит, туф, сланец, песчаник, известняк, кварцит. Чаще всего натуральные камни используют при облицовке зданий, как изнутри, так и снаружи. Природный камень износостоек, морозоустойчив и почти не впитывает влагу. Камень в строительстве используют после механической обработки – расколки и обтески, распиловки, шлифования и полирования, дробления и рассева. В некоторых случаях их применяют в первоначальном виде;

5) **thatch –** солома, как строительный инструмент известна давно. Из нее изготавливали кровлю дома, использовали для утепления чердака, строили стены домов и т.д. Более 150 лет назад, стали использовать соломенные блоки в качестве материала для строительства стен. В 80-е годы строительство домов из соломы получило новый толчок популярности, благодаря такому уникальному сочетанию качеств, как экологичность, низкая теплопроводность и прочность;

6) **concrete –** бетон, это искусственный камень, полученный путем смешения цемента, гравия и воды. Цемент образует с водой цементный гель, который, обволакивая заполнитель, соединяет его в единое целое. Обыкновенный бетон приготавливают из цемента, гравия и воды. Тощий бетон – это бетон с пониженным содержанием цемента и, собственно, с пониженной прочностью. Водонепроницаемый бетон – это плотный специальный бетон. Железобетон – это бетон, армированный конструкционной сталью; его применяют, например, при выполнении бетонных перекрытий. Легкий бетон содержит легкие заполнители, такие, как пемза, керамзит, вспученный перлит, и применяется главным образом для изготовления легкобетонных блоков;

7) **metal** – металл, железные руды – это химические соединения железа с другими элементами. Соединения возникают в основном с кислородом. Они содержат, кроме кислорода, такие составляющие, как например кварц, глину, шифер и известь. Железные конструкционные материалы получают посредством различных методов изготовления и дальнейшей обработки, с помощью присадок других материалов (легирования) и путем тепловой обработки. При этом получают различные подходящие для цели применения свойства, как, например, для строительства из стальных конструкций, для железобетонного строительства или для строительства с применением предварительно напряженного железобетона;

8) **glass –** стекло. Строительное стекло служит для остекления световых проёмов, устройства прозрачных и полупрозрачных перегородок, облицовки и отделки стен, лестниц и других частей зданий. К строительным стеклам относят также тепло- и звукоизоляционные материалы из стекла (пеностекло и стеклянная вата), стеклянные трубы для скрытой электропроводки, водопровода, канализации и других целей, архитектурные детали, элементы стекложелезобетонных перекрытий и т. д. Большая часть ассортимента строительного стекла служит для остекления световых проёмов: листовое оконное стекло, зеркальное, рифлёное, армированное, узорчатое, двухслойное, пустотелые блоки и др. Тот же ассортимент стекла может быть использован и для устройства прозрачных и полупрозрачных перегородок;

9) **plastic –** пластик – это искусственный материал, который содержит полимеры. **Пластик** используют в строительстве при облицовке стен интерьеров домов, жилых и производственных зданий, дверных полотен и

встроенной мебели. Преимуществом пластика как декоративно-облицовочного материала, является небольшая масса, светостойкость и гигиеничность. Обладая высокой химической стойкостью, материал не портится во время воздействия различных моющих средств во время эксплуатации поверхностей, отделанных таким материалом;

10) **foam –** пенопласт. Основная функция, которую он выполняет сейчас в строительстве, – это утепление. Утепляют не только здания, но и большегрузные автомобили, и холодильники, и автохолодильники, и овощехранилища, в общем все, что требует утепления, а правильнее сказать – все, что требует сохранения заданной температуры. Это значит, что пенопласт может играть роль не только утеплителя, но и термоса. Утепляются не только стены зданий, но также потолков, полов и крыш, отмосков и фундаментов. С эффективностью и долговечностью пенопласта могут поспорить только новые жидкие, но затвердевающие средства по утеплению на основе пенополиуритана;

11) **cement –** искусственное неорганическое вяжущее вещество. Один из основных строительных материалов. При затворении водой, водными растворами солей и другими жидкостями образует пластичную массу, которая затем затвердевает и превращается в камневидное тело. В основном используется для изготовления бетона и строительных растворов. Цемент является гидравлическим вяжущим и обладает способностью набирать прочность во влажных условиях, чем принципиально отличается от некоторых других минеральных вяжущих – (гипса, воздушной извести), которые твердеют только на воздухе;

12) **brick –** кирпич – искусственный камень правильной формы, используемый в качестве строительного материала, произведённый из минеральных материалов, обладающий свойствами камня, прочностью, водостойкостью, морозостойкостью. Наиболее известны четыре вида (типа) кирпича: саманный – из глины и наполнителя; керамический (глиняный, красный) – из обожжённой глины; силикатный, состоящий из песка и извести; гиперпрессованный;

Part 2.

13) **construction paints –** строительные краски;
14) **raw materials –** сырьевые ресурсы;
15) **manufacturing process –** технологический процесс;
16) **grinding –** размельчение;
17) **sizing –** сортировка;
18) **combining** – комбинирование;
19) **extrusion –** экструдирование, выдавливание, прессование;
20) **coating –** облицовка, напыление, грунтовка;
21) **drying** – высушивание, просушивание;
22) **firing** – обжиг, сжигание;

23) **packaging –** упаковывание;
24) **quality control** – контроль качества;
25) **weight-bearing building units –** несущие строительные блоки;
26) **mineral content of the raw materials –** минеральный состав сырья;
27) **hydration –** увлажнение, гидратация;
28) **redistribution** – перераспределение;
29) **chemical admixtures** – химические добавки;
30) **workability** – обрабатываемость, технологичность.

БИБЛИОГРАФИЧЕСКИЙ СПИСОК

1. Longman. Dictionary of Contemporary English [Text] / Longman. – Longman Group, 2001.

2. Thompson, D. Oxford Russian Dictionary [Text] / D. Thompson. – Oxford University Press, 2007.

Электронные ресурсы интернета

1. http://www. wikipedia.org (дата обращения 18.11.14)
2. http://www.lifeglobe.net (дата обращения 19.11.14)
3. http://www.aroj.com (дата обращения 20.11.14)
4. http://www.ehow.com (дата обращения 21.11.14)
5. http://dic.academic.ru (дата обращения 23.11.14)
6. http://www.newworldencyclopedia.org (дата обращения 24.11.14)
7. http://agpglass.com (дата обращения 26.11.14)

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